BACHARACH
The Measurable Difference

H-25C

INDUSTRIAL HALOGEN LEAK DETECTOR

Instruction 3015-0216
Operation & Maintenance
Rev.0

Product Leadership ● Training ● Service ● Reliability

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INTRODUCTION

1. **H-25C Halogen Leak Detector Applications**
2. **Unpacking and Initial Checks**
3. **Warranty**
4. **Procuring and Storing Frequently Replaced Maintenance Items**
5. **Operating Precautions**
6. **Preparing for Use**
7. **Special Symbols and Formatting Used in this Manual**

1. H-25C Halogen Leak Detector Applications

Coolant leaks adversely affect the performance of refrigeration and air conditioning equipment. Leak detection is therefore one of the most important items of a quality inspection.

The H-25C Halogen Leak Detector is an instrument that will detect leaks of freon gases such as HFC 134a and CFC 12, which are used as coolants in electric refrigerators, commercial freezers, and automotive air conditioners.

This instrument is particularly suited for leak detection in manufacturing inspection processes.

Remarks: HFC - 134a; Hydrofluorocarbon (R - 134a)
CFC - 12; Chlorofluorocarbon (R - 12)
Note: In this manual these will be hereafter written as R - 134a and R - 12.

2. Unpacking and Initial Checks

Your H-25C Halogen Leak Detector was carefully inspected at the factory before shipment, and packed so as to be highly resistant to damage while in transport. However, when you receive the unit, please unpack it promptly and make a visual inspection to make sure that no damage has occurred during shipment. Please also verify that the specifications of the instrument that you have received match your order. To check the specifications, examine the model code information on the nameplate at the rear of the instrument (see page 1 - 4 for the meanings of the codes).

Note that the H-25C Halogen Leak Detector comes with the following accessories.
Please check also that all of these items are present.

Item Name	Quantity	Remarks
Power cable	1	Length: 3 m, with grounding plug
Probe	1	As per type of probe ordered
Spare filter (for S-type probe) Spare filter and o-ring (for L-type probe)	1 set	
Spare activated-charcoal pack	1	For activated – charcoal pack
Sensor	1	
Power switch ON/OFF key	2	
Spare fuse	1	Stored inside power cable connector (see Section 5.6)

3. Warranty

Failures occurring within one year of the purchase date will be repaired free of charge if the problem is determined to clearly be the responsibility of BACHARACH.

Note this warranty does not apply to the sensor and filters (probe filter, activated charcoal filter).

4. Procuring and Storing Frequently Replaced Maintenance Items

You will need to procure certain maintenance items (see page 1 - 4) on a regular basis.
We strongly recommend that you keep a stock of sensors and filters on hand at all times.

Note that the sensor will deteriorate even while in storage if exposed to humidity.
Always store the sensor in the sealed condition in which you received it.

5. Operating Precautions

5.1 Precautions Regarding High-Temperature Parts and High-Voltage Circuits

Parts of the H-25C operate at high temperatures and voltages.
Be very careful not to touch these parts, as burns or electric shock will result.

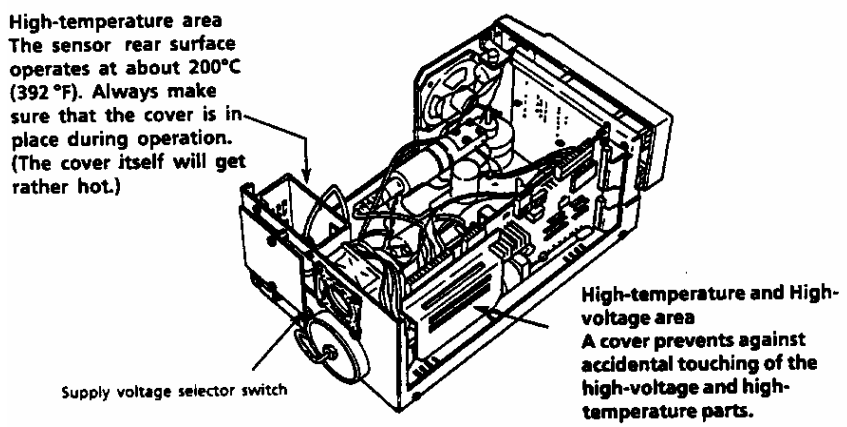

High-temperature area
The sensor rear surface operates at about 200°C (392 °F). Always make sure that the cover is in place during operation. (The cover itself will get rather hot.)
High-temperature and High-voltage area
A cover prevents against accidental touching of the high-voltage and high-temperature parts.
Supply voltage selector switch

Figure 1. High-Temperature and High-Voltage Circuit Areas

Always take precautions to discharge static electricity from your body before touching the ROM or associated circuits.

Exposing the ROM on the printed circuit board to strong static electric charges may cause malfunction. Be very careful when the air is dry and static electricity is easily generated.

5.2 Avoiding Problems

- Please strictly observe the following:

  Always power the H-25C from the proper AC line voltage for its specification. Always set the supply voltage selector switch to the proper position for the voltage in use.

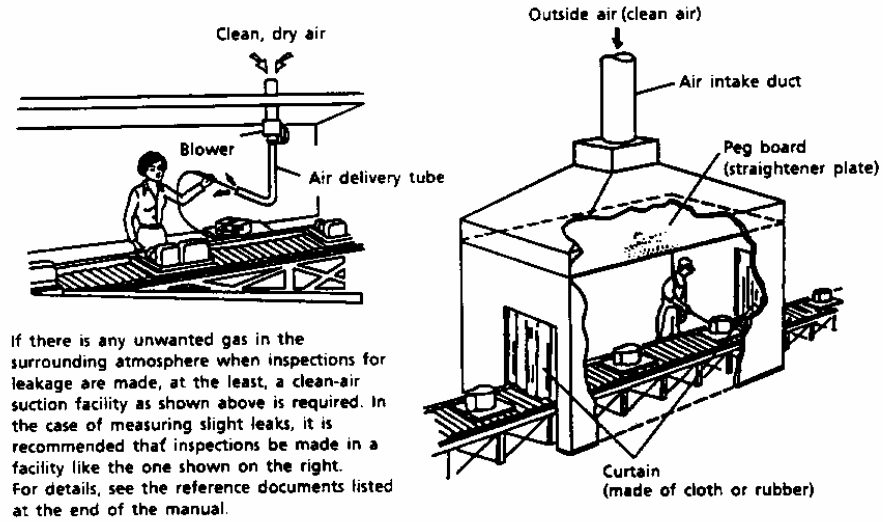
  Transformer damage will result if you mistakenly connect a 100 V range instrument to a 200 V range power source.

- Do not let the probe absorb liquid or highly concentrated halogen gas. Doing so will shorten the life of the sensor and the activated charcoal filter, and may cause malfunction.

  To keep dust and other foreign matter from being sucked into the instrument, always attach a probe when operating the instrument.

- Use the H-25C only indoors or in an equivalent environment.
  When storing the H-25C, select a location where it will not be exposed to corrosive gases or high humidity.

To obtain the best leak detection performance, keep the following in mind:
- Ventilate the work area well so that contaminants cannot accumulate in the air.
- The surface on which you place the H-25C should be nearly horizontal, and should not vibrate.



If there is any unwanted gas in the surrounding atmosphere when inspections for leakage are made, at the least, a clean-air suction facility as shown above is required. In the case of measuring slight leaks, it is recommended that inspections be made in a facility like the one shown on the right. For details, see the reference documents listed at the end of the manual.

Figure 2. Examples of Facilities that Rid Atmosphere of Unwanted Gases Where Leakage Inspections Are Made

6. Preparing for Use

Before using the H-25C, you must set various switches according to the detection conditions (gas to be detected, detection sensitivity, etc.), and make various adjustments (calibration gas secondary pressure, calibration request interval, etc.) in order to obtain proper operation.

The text that follows shows the basic procedures for preparing to use the H-25C, and the measurement and calibration procedures. For details, see Sections 2 through 4 of this manual. Note that this manual explains both how to operate and how to maintain the H 25C. Also, in case of malfunction, this manual explains how to make those repairs which can be made by a user. You should be sure to read this entire manual once before using the instrument.
Note: This manual applies to instruments manufactured after September '94.

The parts in instruments manufactured before September '94 are different.

Preparing for Use & Measurement and Calibration

Preparing for Use

Operation	Remarks	
1. Install the sensor	(See Section 2.1)	
2. Set the switches		
• Supply voltage selector switch	(See Subsection 2.2.1)	
• Type-of-gas selector switch	(See Subsection 2.2.2)	Factory setting: R134a
• Measuring units selector switch	(See Subsection 2.2.3)	Factory setting: Std. ml/s
(1) Measurement unit selection	(See Subsection 2.2.4)	Applies if equipped with contact output
(2) Contact status selection at alarm output		
(3) Measurement mode (A-type / B-type selection	(See Subsection 2.2.5)	Factory setting: A-type mode (*1)
• Alarm point setting switches	(See Subsection 2.2.6)	
• Cal. Mode (auto / manual) selector switch	(See Subsection 2.2.7)	
• Cal. Request interval setting switch	(See Subsection 2.2.8)	Factory setting: 4 hours
• Search mode sensitivity switch	(See Subsection 2.2.9)	Factory setting: 5 times
3. Connect the probe	(See Section 2.3)	
4. Connect the power cable	(See Section 2.4)	
5. Apply power (turn power switch ON)	(See Section 2.5)	Begin warm-up
6. Adjust cal gas secondary pressure (within 3 minutes after power-ON)	(See Section 2.6)	
7. Calibrate (at least 30 minutes after cal gas secondary pressure adjustment)	(See Chapter 3)	
8. Adjust speaker tone volume	(See Section 2.8)	
9. Allow suction of air (Power OFF)	(See Section 2.9)	

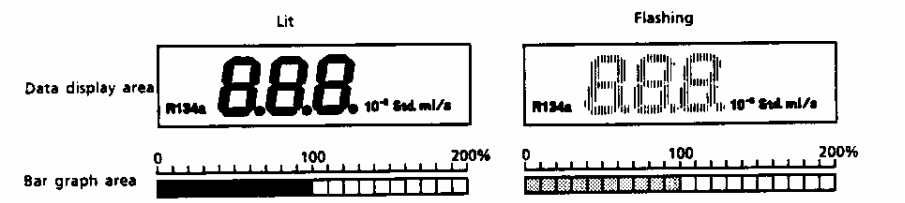
Measurement and Calibration

Operator action	Data Display	Bar Graph Display	Speaker Tone
1. Apply power (turn power switch ON)	.(Displays all) ."H25" .Version No.		
Warm-up (180 seconds)	."180" – "0" (Countdown)	.Pressure kPa {kgf/cm^2} 100% : 100 {1.0} 200% : 200{2.0} .(% value)	
Ready for measurement (search mode)	Measured value (lit)		.Continuous tone upon detection
2. Leak detection Leak location search : Search mode (probe switch OFF : not pressed)	.Measured value (lit)	.Search mode alarm Percent of point (auto-zero operates at 20% or below)	.Continuous tone upon detection (10% or higher)
Leak flow measurement : Pass/fail Mode (probe switch ON : depressed)	.Measured value (flashing)	.Percentage of alarm point	.Intermittent tone upon detection (100% or higher)
3. Calibration (auto) Insert probe into "CAL PORT"	."CAL" (3 seconds) ."7" – "0" (countdown)	.Pressure	.7 to 4 : Continuous tone 3, 2, 1 : Short tone
Pull probe out when count reaches 0. (let suck air)			0 : Continuous tone
Wait for sensor output to stabilize.	."…"	.Sensor sensitivity	
Ready for measurement (search mode)	.Measured value (lit)	.(% value)	

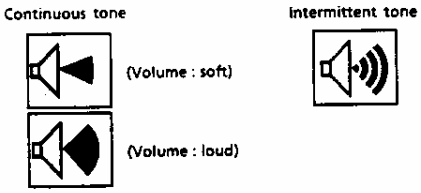
Note: The above table- shows the basic procedures for preparing to use the H-25C with auto calibration, and the measurement and calibration.
*1 : Check how measurements are made with the measurement mode set to A-type. Note that B-type mode is generally used for detecting leaks.

7. Special Symbols and Formatting Used in This Manual

- The Display State (Lit or Flashing) is Indicated in Figures as follows:

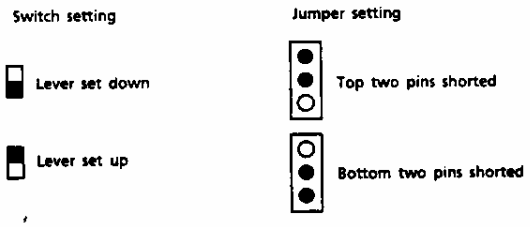


- **The Speaker Tone is Illustrated as follows:**



Note: No figure are provided for high or low tone since they are unnecessary.

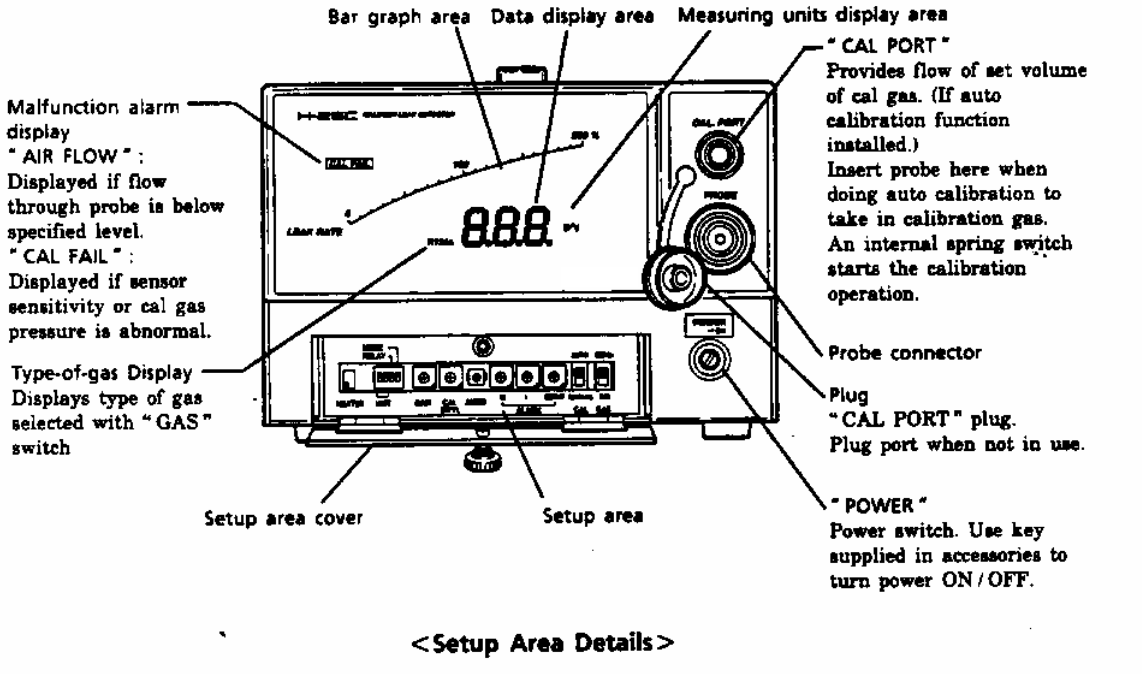
- **The Switch and Jumper Setting Positions are Indicated in Figures as follows:**



1. NAMES AND FUNCTIONS OF COMPONENTS

(Model codes, specifications, gases measured, calibration gas flow)

1.1 Setup Area Details


Bar graph area
Data display area
Measuring units display area
" CAL PORT "
Provides flow of set volume of cal gas. (If auto calibration function installed.)
Insert probe here when doing auto calibration to take in calibration gas.
An internal spring switch starts the calibration operation.
Malfunction alarm display
" AIR FLOW " :
Displayed if flow through probe is below specified level.
" CAL FAIL " :
Displayed if sensor sensitivity or cal gas pressure is abnormal.
Type-of-gas Display
Displays type of gas selected with " GAS " switch
Probe connector
Plug
" CAL PORT " plug.
Plug port when not in use.
" POWER "
Power switch. Use key supplied in accessories to turn power ON / OFF.
Setup area cover
Setup area

<Setup Area Details>

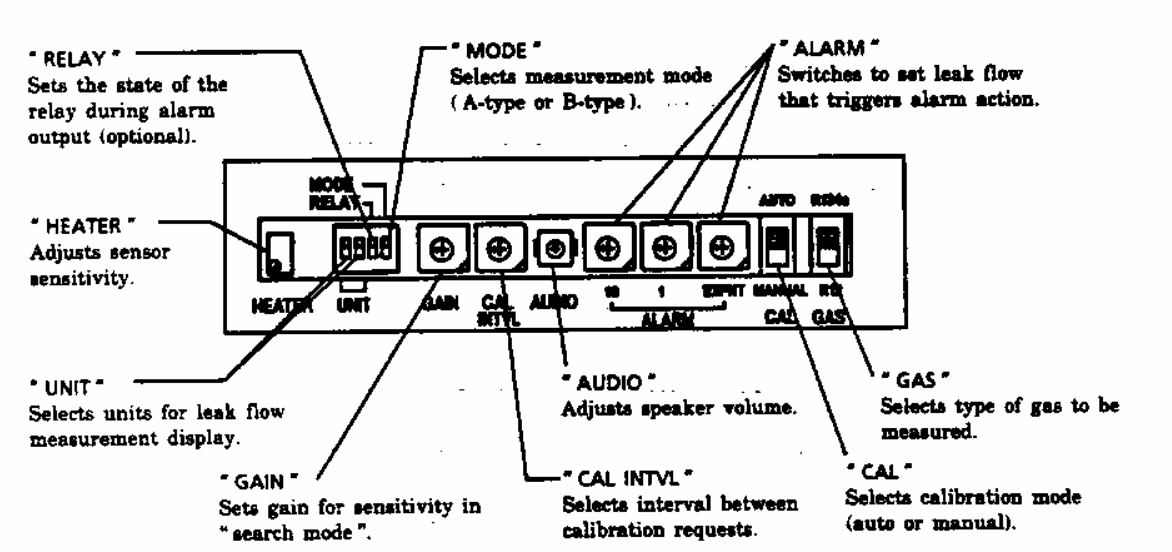
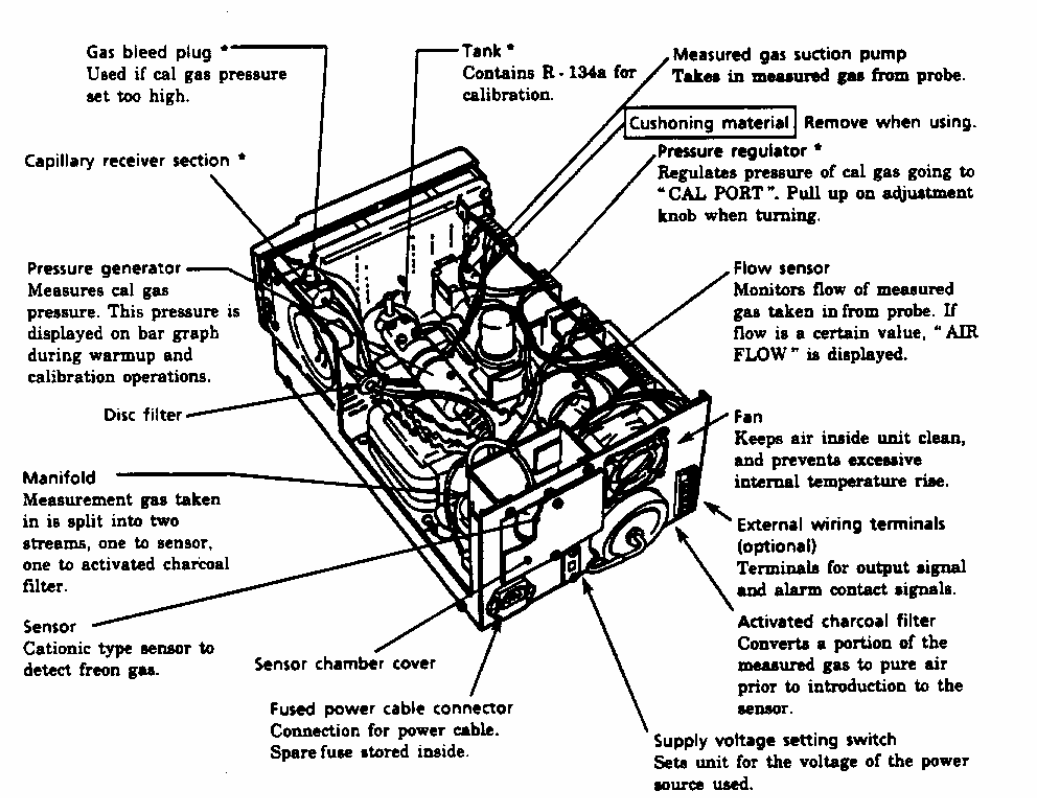


Figure 1.1 Component Names and Functions (Main Unit, 1/3)


Gas bleed plug *
Used if cal gas pressure set too high.
Tank *
Contains R - 134a for calibration.
Measured gas suction pump
Takes in measured gas from probe.
Cushoning material
Remove when using.
Capillary receiver section *
Pressure regulator *
Regulates pressure of cal gas going to "CAL PORT". Pull up on adjustment knob when turning.
Pressure generator
Measures cal gas pressure. This pressure is displayed on bar graph during warmup and calibration operations.
Flow sensor
Monitors flow of measured gas taken in from probe. If flow is a certain value, "AIR FLOW" is displayed.
Disc filter
Fan
Keeps air inside unit clean, and prevents excessive internal temperature rise.
Manifold
Measurement gas taken in is split into two streams, one to sensor, one to activated charcoal filter.
External wiring terminals (optional)
Terminals for output signal and alarm contact signals.
Sensor
Cationic type sensor to detect freon gas.
Activated charcoal filter
Converts a portion of the measured gas to pure air prior to introduction to the sensor.
Sensor chamber cover
Fused power cable connector
Connection for power cable.
Spare fuse stored inside.
Supply voltage setting switch
Sets unit for the voltage of the power source used.

Note : Parts marked with asterisk (*) are added to the detector with auto cal.

Figure 1.2 Component Names and Functions (Main Unit, 2/3)

1.2 Model Codes

MODEL	SUFFIX CODES	DESCRIPTION
H-25C		
Auto CAL function	-N -1	No (calibrate manually with external gas source Yes (both auto and manual calibration possible)
Contact Output	-N -1	No Relay Yes Dry Contact Relay Output
Supply voltage	-5 -6 -7	100/115 V, 50/60 Hz 120/240 V, 50/60 Hz 110/220 V, 50/60 Hz
Analog output	-N -1	No Yes 0-1V DC Analog Output
Instruction Manual	-E -J	English Language Japanese Language
Probe	-P0 -P1 -P2 -P3 -P4 -P5 -P6	6 ft. mini-probe 15 ft. mini-probe 6 ft. probe 15 ft. probe (Standard) 25 ft. probe Type L, (6 ft.) H25B tip Type L, (15 ft.) H25B tip

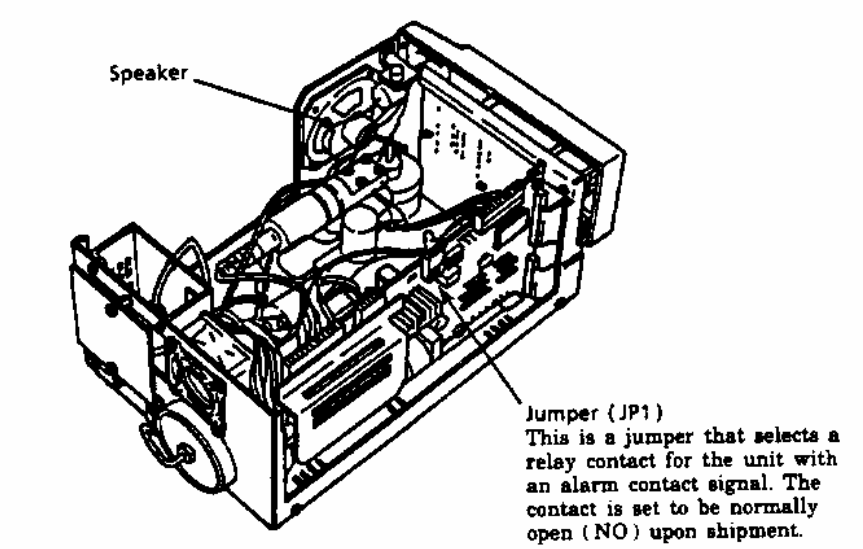

Speaker
Jumper (JP1)
This is a jumper that selects a relay contact for the unit with an alarm contact signal. The contact is set to be normally open (NO) upon shipment.

Figure 1.3 Component Names and Functions (Main Unit, 3/3)

1.3 SPECIFICATIONS

Specifications	
Gas Measured:	R134a or R12 gas
Sensor:	Cationic emission type sensor
Measurement Range:	$9x10^{-5}$ to $9x10^{-4}$ std. ml/s, 1.5 to 150 g/yearly, 0.05 to 5.0 oz/yearly) Note: One std. ml/s: Flow volume per second, converted to equivalent gas at 0° C 1 atm.
Alarm Point Setting Range:	$9x10^{-6}$ to $9x10^{-4}$ std. ml/s, 1.4 to 99 g/y, 0.05 to 5.0 oz/y
Measurement Modes:	B-type measurement mode (for detecting leaks in a normal atmosphere Auto zero mode: (for searching for leaks) Auto zero hold mode: (for measuring leak flow) A-type measurement mode (for detecting leaks in a clean atmosphere) Search mode: (for searching for the location of leaks) Pass/fail mode: (for measuring leak flow)
Measurement Units:	Either "$x10^{-5}$ std. ml/s" (x10-5 std. ml/s) or "g/y" can be selected
Response Time:	Approx. 1 second
Calibration:	Auto calibration (function supplied as option if specified) Manual calibration (using "LS20B Leak Standard")
Output Signal:	0 to 1V DC, output resistance 1Ω max. (function supplied as option if specified
Contact Output:	One "Alarm" point (output generated when measurement exceeds alarm setting) (function supplied as an option if specified) Relay state: Either an energized or de-energized state can be selected when the output is sent out. Contact States: NO or NC, selectable Contact rating: 2A (250 V AC, 30V DC)
Displays:	Data display (3 digit numeric display) Measured value, warm-up time countdown, cal request, idling operation, ect. Bar graph indicator (0 to 200% in 20 segments) Measured value, cal gas pressure – if equipped with auto cal function (indicated during warm-up and during calibration), sensor sensitivity (at cal completion), etc. Malfunction alarm display "AIR FLOW" (measured gas intake flow), "CAL FAIL" (EE Prom failure, calibration gas pressure low, unable to calibrate) Type of gas display Unit Probe indicator (LED) Indicates leak detection, cal request, cal operation in progress
Audio Speaker:	Leak detection, cal request, cal operation in progress
Supply Voltage;	100/115V AC, 50/60 Hz, 110/220 V AC, 50/60 Hz, or 120/240 V AC, 50/60 Hz
Power Consumption:	100VA
Dimensions:	148 H x 210 W x 330 D mm, (5-13/16 H x 8¼ W x 13D in)
Weight:	Approx. 10 kg (22lbs)

1.4 Probes

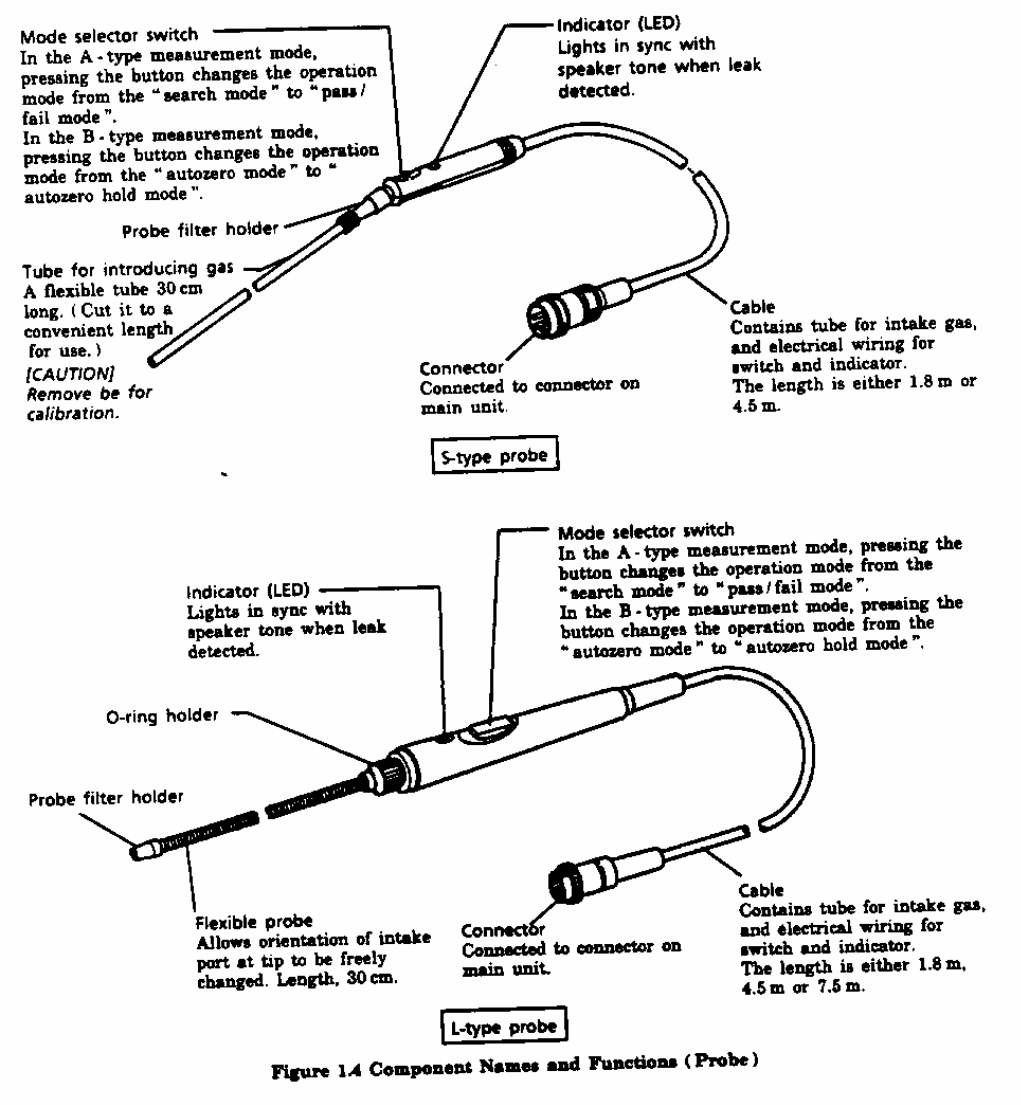

Mode selector switch
In the A - type measurement mode, presaing the button changes the operation mode from the " search mode " to " pass / fail mode ".
In the B - type measurement mode, pressing the button changes the operation mode from the " autozero mode " to " autozero hold mode ".
Indicator (LED)
Lights in sync with speaker tone when leak detected.
Probe filter holder
Tube for introducing gas
A flexible tube 30 cm long. (Cut it to a convenient length for use.)
[CAUTION]
Remove be for calibration.
Connector
Connected to connector on main unit.
Cable
Contains tube for intake gas, and electrical wiring for switch and indicator.
The length is either 1.8 m or 4.5 m.
S-type probe
Mode selector switch
In the A - type measurement mode, pressing the button changes the operation mode from the " search mode " to " pass / fail mode ".
In the B - type measurement mode, pressing the button changes the operation mode from the " autozero mode " to " autozero hold mode ".
Indicator (LED)
Lights in sync with speaker tone when leak detected.
O-ring holder
Probe filter holder
Flexible probe
Allows orientation of intake port at tip to be freely changed. Length, 30 cm.
Connector
Connected to connector on main unit.
Cable
Contains tube for intake gas, and electrical wiring for switch and indicator.
The length is either 1.8 m, 4.5 m or 7.5 m.
L-type probe

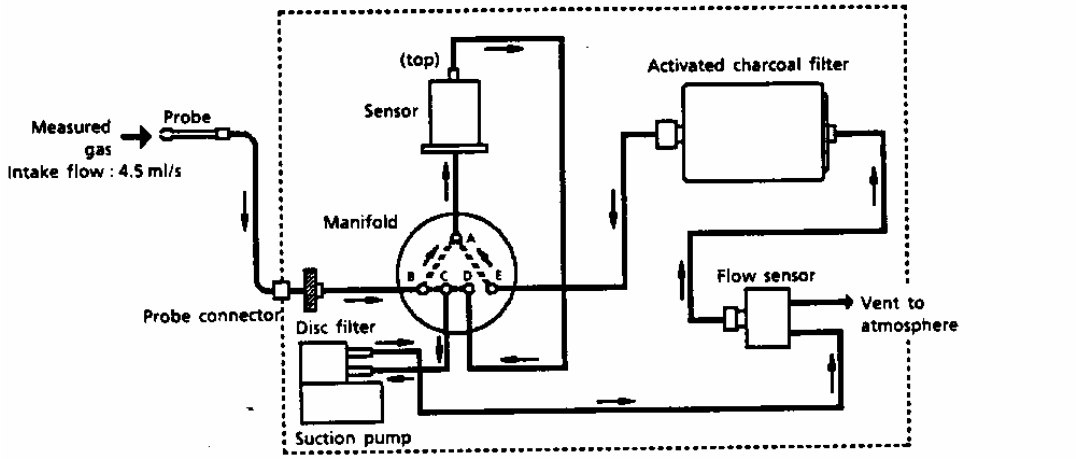
Figure 1.4 Component Names and Functions (Probe)

1.5 Accessories and Maintenance Tool List

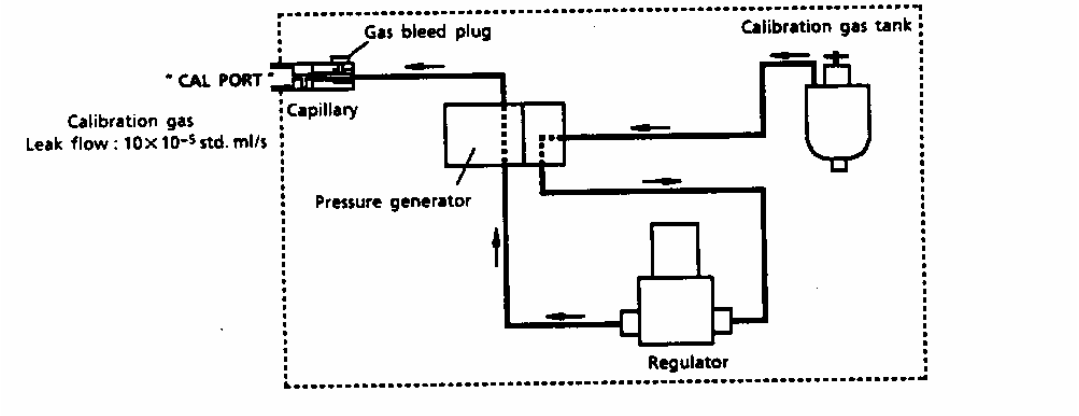
Item Name	Part Number	Remarks
Filter (For S-type probe)	3015-1820	Unit of purchase : 1 piece
Filter, O-ring (for L-type probe)	3015-1705	Unit of purchase : 1 set (one piece each)
Activated – Charcoal pack	3015-2418	Unit of purchase : 1 set (five pieces)
Sensor	3015-0807	Unit of purchase : 1 piece
Fuse (rating: 3.15A 250V	3015-1630	Unit of purchase : 2 pieces
Disc Filter	3015-2476	Unit of purchase : 1 piece
Freon filler fitting	3015-1433	Used when filling tank with liquid freon for use in calibration

1.6 Internal Flow Paths

- **Measured Gas Internal Flow Path**



- **Calibration Gas Internal Flow Path (when equipped with auto calibration function)**



2. PREPARING FOR USE

This section explains the switch settings and other procedures that must be done to prepare the instrument for use. For operating instructions, see Section 4.

2.1 Installing the Sensor

Note: The sensor may deteriorate during storage due to the effects of water vapor in the air. Therefore, the instrument is shipped with the sensor removed and sealed in a humidity-excluding bag.

Install the sensor as follows:

(1) Remove the sensor changer cover.

(2) Remove the protective cap attached to the sensor mounting socket.

(3) Insert the sensor pins into the holes in the socket.

(4) Push the tubing connector securely onto the top of the installed sensor.

(5) Re-attach the sensor chamber cover.

Note: The sensor surface temperature reaches about 200°C (392°F) during operation. Always keep the sensor chamber cover in place so as to prevent fires and other accidents.

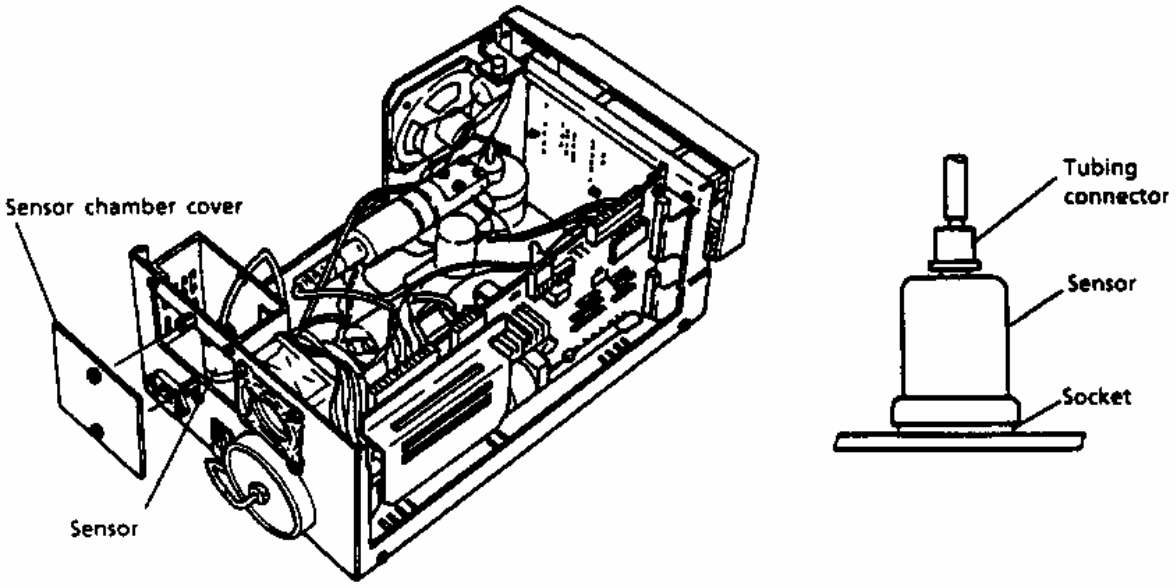


Figure 2.1 The Sensor as Mounted

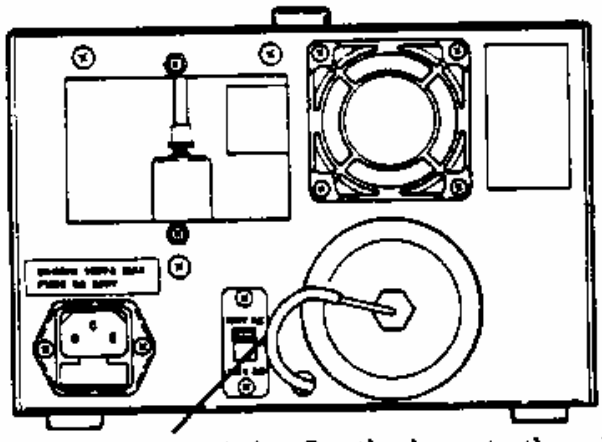
2.2 Setting the Switches

2.2.1 Setting the Supply Voltage Selector Switch

Note: The H-25C comes with three different supply voltage specifications, 100/115 VAC, 100/200 VAC, Or 120/240 VAC. The frequency can be either 50 or 60 Hz. Use the supply voltage selector switch on the rear of the H-25C to select 100 and 115 V, 110 and 220 V, or 120 and 240V.

Set the supply voltage selector switch to the side labeled appropriate to the AC line voltage you intend to use.

The H-25C Halogen Leak Detector will operate properly o AC power of voltage matching the instrument specifications.



Supply voltage selector switch : Set the lever to the relevant voltage indication.

Figure 2.2 Setting the Supply Voltage Selector Switch

2.2.2 Setting the "GAS" (type of gas) Switch

Note: The "GAS" switch is at the right of the setup area on the main unit front. Open the setup area cover to gain access to it.

Set the "GAS" switch lever to the "R134a" position if using the instrument for R134a leak detection, or to the "R12" position if using the instrument for R12 leak detection.

Note: Can also be used to detect leaks of certain freons (R22) and freon substitutes (R502) in addition to R12. If using the instrument to detect leaks of these substances, set the switch to the R12 position.

2.2.3 Setting the "UNIT" (unit selector) Switches

The measurement units to be used are set with the "UNIT" switches (1,2). Set the switches as follows.

The unit that can be registered is either "X 10-5 std. ml/s" or "g/y".

Note that the units for leak flow are to be selected from among "X10-5 std. ml/s", "g/y", and "oz/y"

Note: The selected units are indicated in the display area during measurement.

" UNIT " switches

" UNIT " (unit selector) Switch Settings

Units	Switch Positions	Indication in Display Area
$\times 10^{-5}$ std. ml/s		$\times 10^{-5}$ Std. ml/s
g/y		g/y

2.2.4 Setting the "RELAY" (Relay State Selector) Switch

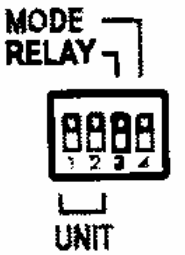
Note: The "RELAY" switch (3) must be set if the instrument is equipped with the alarm contact signal output function.

The alarm contact signal is output when the leak flow is greater than or equal to the alarm setting. The "RELAY" switch selects whether the relay is to be energized or de-energized at the time.

Since the relay contact is set up at the factory as a normally open (N)) contact, selecting "energize" will result in the contacts closing when the signal is output, whereas selecting "de-energize" will result in the contacts opening.

It is also possible to change the relay connections to use the normally closed (NC) contact (by changing the position of jumper JP1 on the printed circuit board inside the unit).

If you change to the NC contact, then the contacts will be in the closed state when power is OFF. If you have changed to the NC contact, then to have the contacts go to the closed state at time of alarm you must set the switch lever to the "de-energize" position.



" RELAY " switch

" RELAY " (relay state selector) Switch Settings

" RELAY " (relay state selector) Switch Settings	Switch Lever Position
Energized (contacts closed)	
De-energized (contacts open)	

Note: The NO relay contact is connected at the factory. If you need to have the contacts close when power goes OFF, you can change the setting of JP1 to connect the NC contacts.

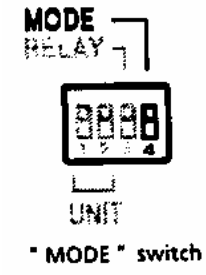
Jumper (JP1) position settings

2.2.5 Setting the "MODE" (Measurement Mode Selector) Switch

Select the measurement mode using the MODE (measurement mode selector) switch.

There are two measurement modes, A-type and B-type. For detecting leaks in a normal atmosphere, set the switch to B-type. (The factory setting is A-type mode.) Select A-type mode if the atmosphere at the measurement site is always clean (extremely small quantity of unwanted gas). For details, see Subsection 4.2.2

Note: When first using this switch, select A-type mode and check it is working.



" MODE " switch

"MODE" (measurement mode selector) Switch Settings

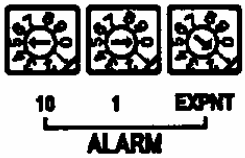
Measurement Mode	Switch Lever Position
Standard measurement mode	
Special measurement mode	

2.2.6 Setting the Alarm Point

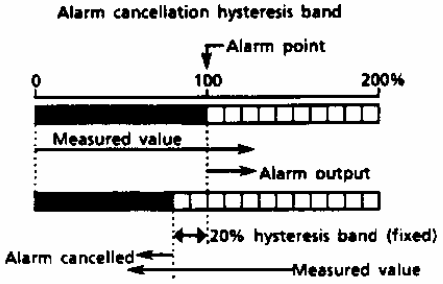
Note: Alarms (intermittent tone from the speaker, flashing indicator lamp) are output when the measured value is greater than or equal to 100% on the bar graph. The value at which the alarm output trips is called the alarm output trips is called the alarm point. Although this point can be freely set by the user, there are restrictions on the lower limit. Also, when A-type measurement mode is selected, the search mode sensitivity is restricted depending on the value set (see Subsection 2.2.9). Generally, set the alarm point used to detect leaks to the highest possible value of leakage.

The alarm point value is set using the "ALARM" switches. The "ALARM" switches consist of three digital switches. The two on the left set a 2-digit number, and the "EXPNT" switch on the right sets the exponent.

Note that if the instrument is equipped with the alarm contact output function, then the contact signal will also be output at alarm output time. The alarm annunciation and contact signal will remain on until the measurement value drops to 20% below the alarm point. (That is, a hysteresis band of 20%.)



" ALARM " switches



"ALARM" (alarm point selector) Switch Settings

"10" Switch	"1" Switch	"EXPNT" Switch
Value of 2nd digit from right	Value of 1st digit from right	Multiplier exponent
X ∗	∗ X	$\times 10^{-X}$

Example: If set as at right, alarm point is
50×10^{-1} $(= 5)$
If units are "$\times 10^{-5}$ Std. ml/s", then this gives a setting of 0.00005 std. ml/s (5×10^{-5} std. ml/s)

Alarm Point Minimum Setting According to Selected Units

Units	Alarm Point Minimum Setting
$\times 10^{-5}$ Std.ml/s	0.1 (10×10^{-2})
g/y	0.1 (10×10^{-2})
oz/y	0.01 $(01 \times 10^{-2}$ or $10 \times 10^{-3})$

2.2.7 Setting the "CAL" (Calibration Mode Selector) Switch

There are two calibration modes: automatic calibration mode and manual calibration mode. If the instrument is not equipped with the auto calibration function, then only manual calibration mode is valid.

The calibration mode is selected using the "CAL" switch.

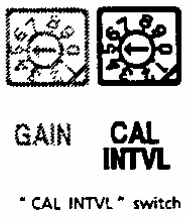
To select auto calibration mode you set the switch to the "AUTO" position, and to select the manual calibration mode you set the switch to the "MANUAL" position.

2.2.8 Setting the "CAL INTVL" (Calibration Request Interval) Switch

The H-25C can issue requests for calibration operations at fixed intervals when A-type measurement mode is selected. At the time of the calibration request, the speaker sounds an intermittent tone for five seconds, and "CAL" is displayed with flashing in the display area (a maximum of ten times during a 15-second period in the measurement mode. The interval between calibration requests can be set in 1-hour increments up to 10 hours.

You use the "CAL INTVL" switch to set the calibration request interval.

Note that the calibration request interval timer is activated at the end of the warm-up time, and is reset whenever power is turned OFF.



" CAL INTVL " switch

"CAL INTVL" (calibration request interval) Switch Settings

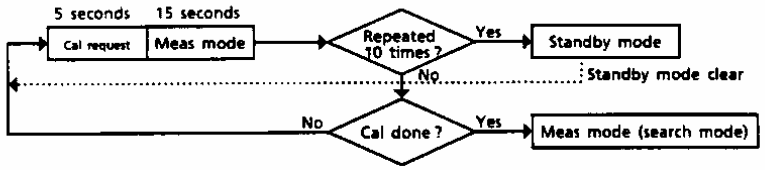
Setting		Remarks
1 : 1 hour	6 : 6 hours	The calibration request interval timer is reset whenever you turn the instrument power OFF. Thus, if you use it only for times shorter than the setting, you will never get a calibration request.
2 : 2 hours	7 : 7 hours	
3 : 3 hours	8 : 8 hours	
4 : 4 hours	9 : 9 hours	
5 : 5 hours	0 : 10 hours	

The drawing at left shows a calibration request interval setting of five hours.

If you do not perform a calibration operation when the calibration request is issued, the instrument will finally go into standby mode.

" Calibration request " display

At the time of the calibration request, the " CAL " message will appear flashing in the display area for five seconds. After that, the instrument will go back to measurement mode for 15 seconds.
If you do not perform the calibration operation before this alternation between calibration request and measurement mode has repeated ten times, the H-25C will go into a standby mode.



Note : See Chapter 3 for a description of the display when the instrument goes into standby mode.
Press the probe switch once very quickly (for less than 0.5 sec.) to clear standby mode.
Clearing standby mode causes " calibration request " to appear again; then perform calibration.

"Calibration Request" Operation

2.2.9 Setting the "GAIN" (Search Mode Sensitivity) Switch

The setting results here are valid only for the search mode I A-type measurement mode.

Raising the sensitivity in order to detect lower values makes it easier to locate leaks.

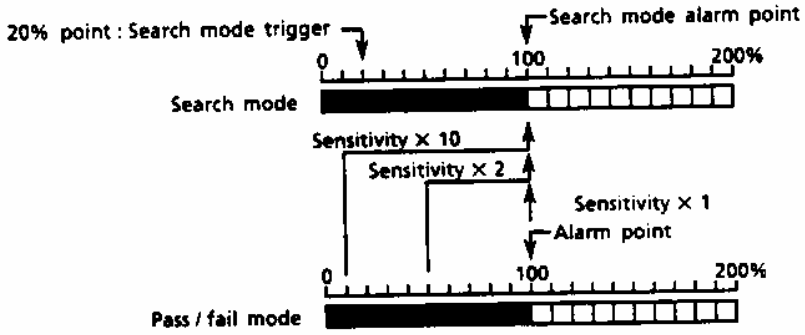
The sensitivity can be raised in search mode in A-type measurement mode, making it possible to find leaks with up to ten times (integer factor) the sensitivity of pass/fail mode used to measure leak flows.

However, the sensitivity multiplication factor is restricted by the alarm contact setpoint.

Restrictions on Search Mode Sensitivity

Measurement Units	Sensitivity Setting Range
$\times 10^{-5}$ std. ml/s	Alarm point value × sensitivity multiplier ≧ 0.1
g/y	Alarm point value × sensitivity multiplier ≧ 0.1
oz/y	Alarm point value × sensitivity multiplier ≧ 0.01

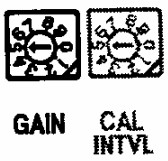
The "alarm point value × sensitivity" is the search mode alarm point, which becomes the 100% value of the bar graph indicator when in search mode.



Caution: In search mode, the 20% point on the bar graph is called the search mode trigger point. Sensor outputs less than the search mode trigger point are assumed to be background potentials, and are displayed as 0% by the auto-zero function..

This means that in search mode you cannot detect leakage levels lower than the search mode trigger. Note: this does not apply in special measurement mode. B-type measurement mode is excluded.

The search mode sensitivity is set by the "GAIN" switch.



"GAIN" switch

"GAIN" ("search mode" sensitivity) Switch Settings

Sensitivity Multiplier (vs. alarm point value)		Remarks
1 : 1 time	6 : 6 times	Selecting a large sensitivity multiplier when the alarm point value is set low may result in the search mode trigger point being exceeded by ambient gas alone (see Subsection 4.2.1). When working in locations where the air is not good, keep this in mind when selecting the multiplier.
2 : 2 times	7 : 7 times	
3 : 3 times	8 : 8 times	
4 : 4 times	9 : 9 times	
5 : 5 times	0 : 10 times	

The drawing at left shows the setting for a sensitivity multiplier of 5.

2.3 Connecting the Probe

Connect the accessory probe to the “PROBE” connection socket on the instrument front panel and secure it with the lock ring.

Note that the probe connection socket gas intake port is covered with a protective cap, which you must remove before connecting the probe.

Note: The Model H-25C detector can be fitted with a probe to satisfy all needs.

2.4 Connecting the Power Cable

The power cable supplied with the instrument (length, 3 m) has a plug with a grounding pole. First, make sure that an AC power receptacle (socket) compatible with this plug is available nearby. The power consumption of this instrument is about 100 VA.

After making sure that you can obtain the line power for which the supply voltage selector switch is set, connect the power cable to the connector on the rear of the instrument. Then connect the plug on the other end to the AC power receptacle.

2.5 Applying Power (Turning the Power Switch ON)

Note When using this instrument, always keep in mind that it contains parts that operate at high temperatures (the sensor), and circuits where high voltages are present, and take care to avoid burns and electric shock. Also, be careful where you place the probe, so that you never allow it to such in any liquid.

When you first use the H-25C Halogen Leak Detector, you must adjust the calibration gas secondary pressure within three minutes of the time that you apply power (if it has the auto calibration function). So, before turning ON the power switch, remove the cover from the main unit.

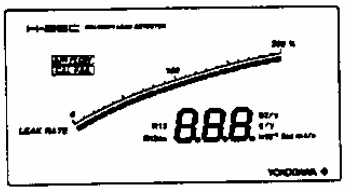
Remove the cushioning material (sponge) inserted between the pump and the printed circuit.

The instrument will begin operating as soon as you turn the power switch ON. The power switch is turned ON and OFF with a key. Insert the key supplied in the accessories into the power switch keyhole and turn to the right (power switch ON).

When you apply power, the instrument will go immediately into warm-up mode. Per form the secondary gas pressure adjustment at once (see Section 2.6).

When power is applied, the display will appear as shown below.

1



For a short time, all display elements will appear. (This lets you check whether the display is operating properly.)

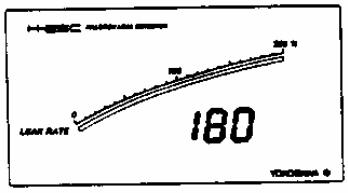
2

" H25 " will appear in the data display area. During this time, an EEPROM memory check is being executed.

3

The software version number is displayed for a short time (approx. 0.5 sec) in the data display area. AA represents the sofware version number.

4



The instrument goes into warmup mode, and a countdown from 180 seconds is displayed in the data display area. During this time the bar graph indicates the calibration gas secondary pressure.
The 0 to 200% range corresponds to 0 to 200 kPaG (0 to 2 kgf/cm²G). since the regulator valve is closed before shipment, nothing will be displayed at first even if the instrument has the auto calibration function.
If " CAL FAIL " is displayed, this indicates that an abnormality was detected by the memory check. If this happens, turn the power OFF and then ON again, and check whether it happens again.

2.6 Calibration Gas Secondary Pressure Adjustment

Note: This adjustment is required in the instrument equipped with the auto calibration function.

The calibration gas secondary pressure adjustment is done during the approximately three minutes of the warm-up period when the pressure is indicated on the bar graph.

In principle, the H-25C is shipped with the calibration gas secondary pressure temporarily adjusted. This section shows, however, the adjustment should be made with the tank valve closed. If it has been temporarily adjusted, make the re-adjustment according to step (3) of the following adjustment procedure give below.

(1) First, make absolutely sure that the regulator valve is completely closed.

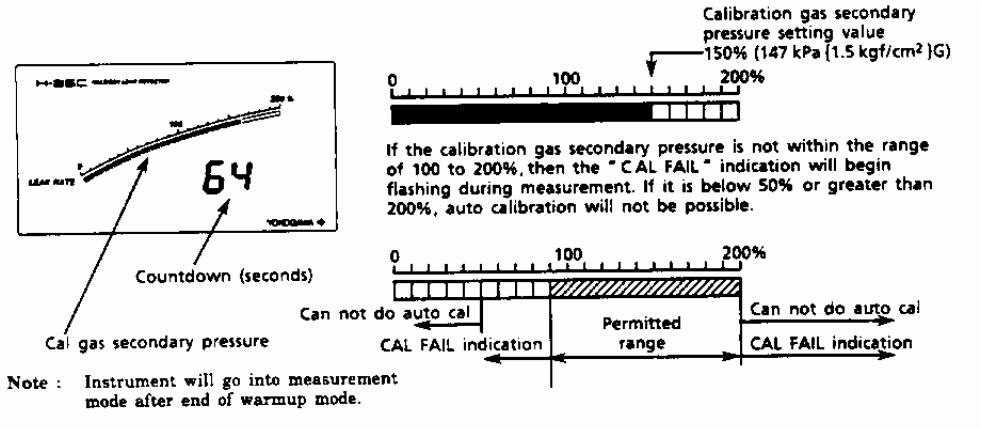
Note: If the regulator valve is open at the time that you open the valve on the calibration gas tank, a pressure of nearly 600KPa (6kgf/cm^2) may be imposed on the calibration gas tubing system. Even though the tubing system will not be immediately damaged even if subjected to this pressure, you should make every effort to avoid this.

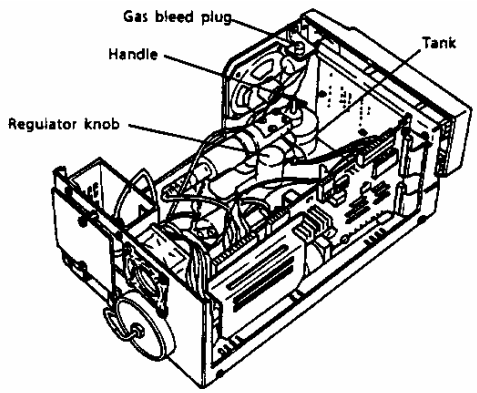
(2) Always pull up on the regulator knob when turning it.
Fully open the valve on the tank. Turn the handle on top ¾ of a turn counterclockwise until you feel it hit a stop, at which point the valve is fully open.

(3) Slowly turn the knob on the regulator valve to open it so as to bring the bar graph indication near the 150% point (147kPa {1.5kgf/cm^2}).

If you turn the knob too far (raise the pressure too high), loosen the gas bleed plug and wait for the pressure to drop to a value below the target, then tighten the gas bleed plug and repeat the adjustment

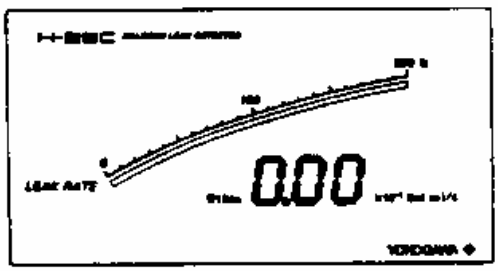
Note: Loosening the gas bleed plug will result in the outflow of much more gas than the amount that flows out from the “CAL PORT”.


64
Countdown (seconds)
Cal gas secondary pressure
Note : Instrument will go into measurement mode after end of warmup mode.
Calibration gas secondary pressure setting value
150% (147 kPa {1.5 kgf/cm² }G)
0
100
200%
If the calibration gas secondary pressure is not within the range of 100 to 200%, then the " CAL FAIL " indication will begin flashing during measurement. If it is below 50% or greater than 200%, auto calibration will not be possible.
0
100
200%
Can not do auto cal
CAL FAIL indication
Permitted range
Can not do auto cal
CAL FAIL indication



The above operations complete the calibration gas secondary pressure adjustment. Replace the cover of the main unit.

When warm up ends, the instrument will go into measurement mode.



Measurement mode display example

The bar graph indication displays the amount of leakage. When the probe switch is not being pressed, the instrument is in search mode and the indicated value is based on the value of the search mode alarm point value. The data display area shows the type of gas selected, and the displayed value and units. Pressing the probe switch to place the instrument in pass/bail mode causes the displayed value to begin flashing.

Note that calibration gas is always flowing out from the “CAL PORT”. Therefore, once the calibration gas secondary pressure has been adjusted, that adjustment need not be done again until the calibration gas (R134a) is exhausted. However, when the instrument not adjusted even temporarily is first adjusted, the pressure may vary slightly in the initial period. You should check the pressure indication (displayed during warm-up and during calibration operations) after one day or more has passed and repeat the adjustment if the pressure is not in the permissible range.

2.7 Calibration

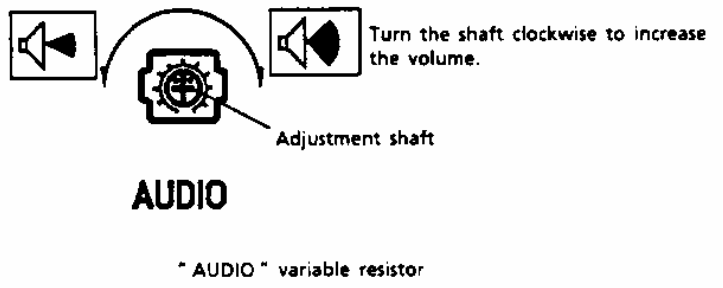
After the instrument has finished warm-up and gone into measurement mode, you can perform a calibration. However, since it is preferable to wait until the sensor temperature has reached its final value, and the instrument as a whole is in a thoroughly stable state, we recommend that you wait at least 30 minutes after the end of warm-up before calibrating.

See Chapter 3 for the calibration procedure.

2.8 Adjusting the Speaker Tone Volume

The speaker volume is adjustable. Adjust if necessary (to the appropriate level for the area where you will use the instrument) using the tones heard while performing the calibration operation of Section 2.7.

The volume is adjusted using the variable resistor labeled “AUDIO” in the setup area.



2.9 Allowing Air to Flow at the End of Preparation

Completing the setup operations through Section 2.8 completes the preparations for use.

If you are not going to begin measurements immediately, let the instrument suck in clean air for at least one minute, and then set the power switch to OFF.

Note: Set the MODE switch to B-type measurement mode when checking operations in A-type measurement mode.

(When detecting leaks in a normal atmosphere, set the switch to B-type.)

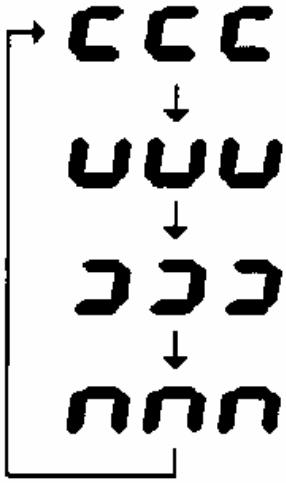
3. CALIBRATION

The Model H-25C Halogen Leak Detector performs calibration when the detector is first used (including sensor sensitivity adjustment and sensor replacement) or when " calibration request " appears in A-type measurement mode. Calibration data are maintained for about three weeks after calibration, then returned to the default values, after which the instrument must be calibrated again.

The calibration request message appears only in A-type measurement mode; it appears after power-on, then again after repeated fixed intervals (calibration request interval). The calibration request message will also appear if the measured value in search mode is at or above the "trigger point"(see Subsection 4.2.1) for more than 20 seconds.

" Calibration request " display

The " calibration request " is indicated by " CAL " being displayed with flashing in the data display area for five seconds. The instrument will then return to measurement mode for 15 seconds.
If you do not perform a calibration before this alternation between " calibration request " and measurement mode has repeated 10 times, the H-25C will go into standby mode.



Display when in standby mode

In standby mode, measurements cannot be performed. The analog output signal, too, will go to and remain at 0% (if the output function is installed). During standby mode, the data display area will cycle repeatedly through the four displays at left, about once each second.

[To cancel standby mode]
Press the probe switch for just a short instant (no more than 0.5 second).
When standby mode is cancelled, the calibration request message will appear again. Perform the calibration.

Calibration is performed using a leak standard that provides a freon gas leak of known flow.

There are two calibration alternatives: auto calibration and manual calibration. The auto calibration method uses a built-in leak standard, and can be used only if the instrument is equipped with the auto calibration option.

When performing a calibration by the manual method, you must change the "ALARM" (alarm point) setting value to the leak flow of the leak standard, but this is not necessary in the case of auto calibration.

For manual calibration, you can use a BACHARACH LS - 20B Leak Standard.

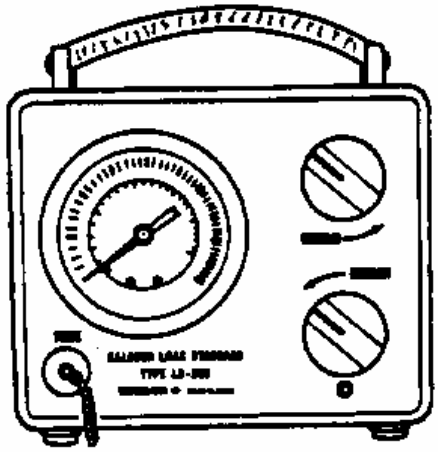


Figure 3.1 LS - 20B Leak Standard

3.1 Auto Calibration

This auto calibration procedure can be used only if the instrument is equipped with the auto calibration option. Auto calibration is not possible when the measurement mode is set to B-type; always set the mode to A-type for auto calibration.

3.1.1 Setting the Switches

Auto calibrations are performed with the " CAL " switch in the setup area set to the AUTO " position. Re-setting of " GAS " and " UNIT " switches is not necessary.

Note : The calibration gas always flows out from the 'CAL PORT" at a flow rate corresponding to the secondary pressure.

Note that the calibration gas used in the H-25C's optional built-in leak standard is R 134a. At a secondary pressure of 170 kPa {1.7 kgf/cm^2} this cal gas will flow out from the " CAL PORT " at a rate of 9 X 10^{-5} to 11 x 10^{-5} std. ml/s.

3.1.2 Operator Actions and the Calibration Operation

Inserting the probe tip into the "CAL PORT" causes a switch inside the port to turn on, starting calibration.

CAUTION: If an S - probe is to be used, remove the tube for introducing gas. Inserting the tube for introducing gas into the "CAL PORT' may damage the spring switch in the detector. If the tube is removed, exercise care not to lose the filter that is in the probe.

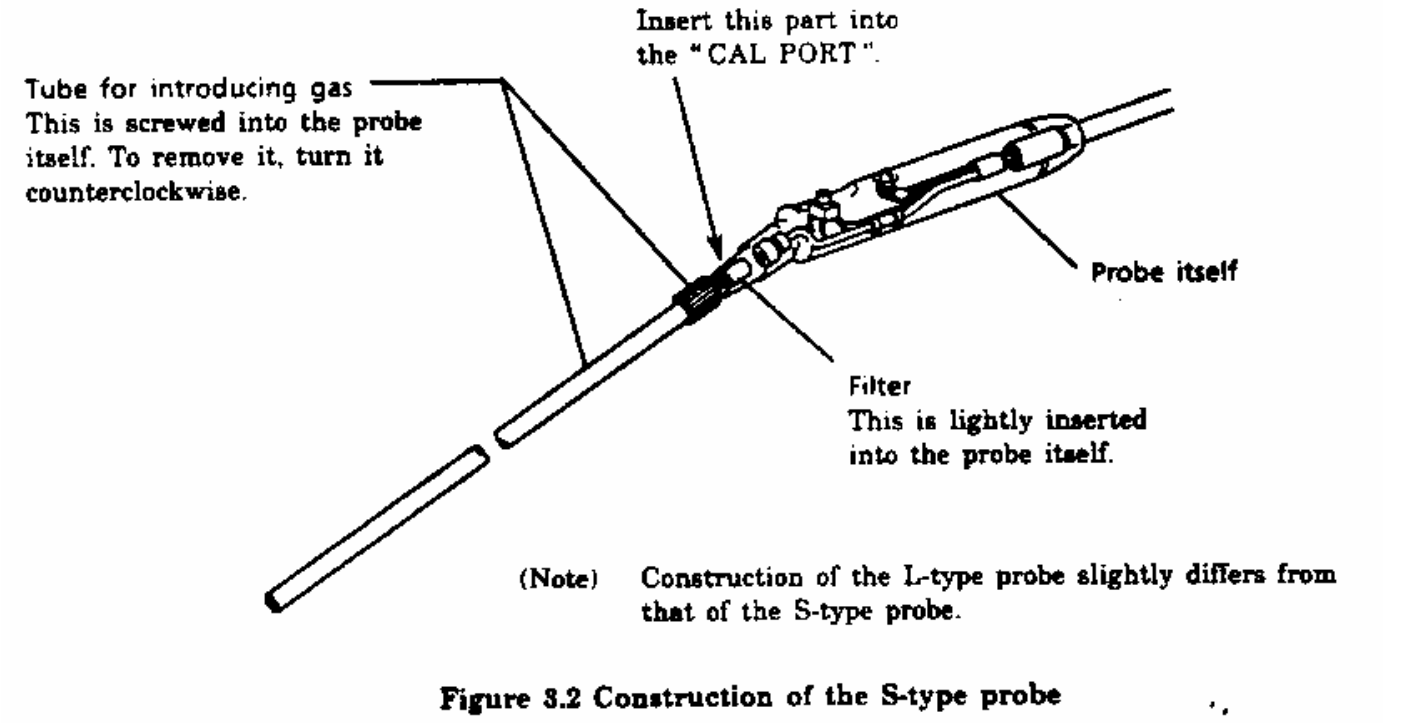
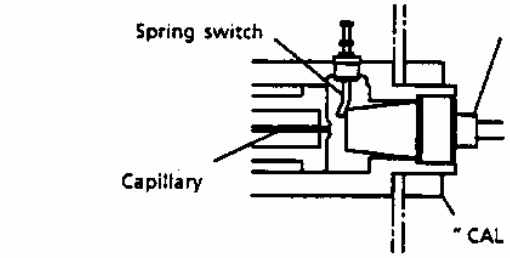

Insert this part into the " CAL PORT ".
Tube for introducing gas This is screwed into the probe itself. To remove it, turn it counterclockwise.
Probe itself
Filter This is lightly inserted into the probe itself.
(Note) Construction of the L-type probe slightly differs from that of the S-type probe.

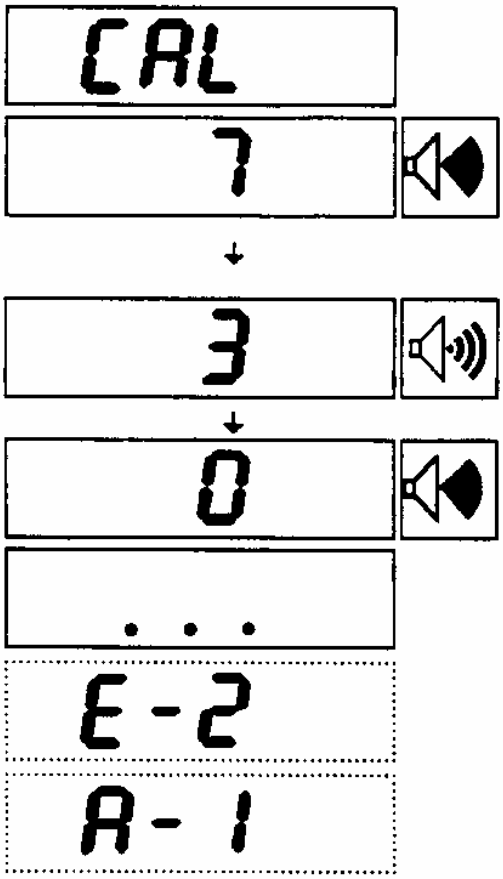
Figure 3.2 Construction of the S-type probe

Continue to hold the probe in the inserted position until the countdown (starting from 7) on the display reaches 0. (Leave the instrument in search mode; do not press the pass/fail switch on the probe.) When the countdown reaches 0, the instrument's internal circuits store the data required for calibration. Disconnect the probe from the "CAL PORT", and let it such in clean air.



Probe tip (The figure shows the construction of the L-type probe.

With the tip of the probe inserted (with the tube for introducing gas removed for the S-type probe), the spring switch turns on to start calibration.



When the calibration starts, " CAL " is displayed for three seconds.

After displaying " CAL ", the display shows a countdown starting from 7 (seconds).
During the countdown from 7 to 4, the speaker sounds a continuous tone.
During the countdown display interval, the bar graph indicates the calibration gas secondary pressure.

On reaching 3, the speaker output changes to an intermittent tone (short tones).

On reaching 0, the speaker outputs a continuous tone.
Disconnect the probe from the " CAL PORT " and allow it to suck in clear, pure air.

When you pull the probe away from the " CAL PORT ", the display will appear as at left until the sensor output stabilizes.
The bar graph indication will display the sensor sensitivity.

If an error is detected, one of the fail codes (E-1 to E-4) is displayed (see Subsection 3.1.3). When a fail code is displayed, calibration is not performed.
If the calibration data approaches the allowable limit even though calibration is being performed, an error code (A-1 to A-4) is displayed for about four seconds before completing calibration (see Subsection 3.1.4).

The figure below shows an example of how the sensor sensitivity is displayed (by the bar graph indicator) during the stabilization wait interval.

Sensor sensitivity display example

3.1.3 What to Do If the CAL FAIL Indicator Appears

If the CAL FAIL indicator appears during calibration, no calibration is performed. When CAL FAIL indicator appears, one of the following five fail codes is displayed on the data display area while the instrument stabilizes.

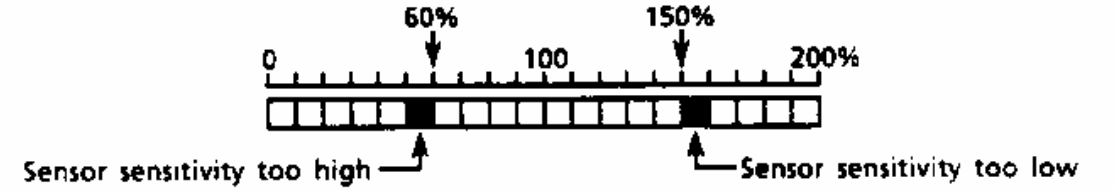
Take appropriate action for the displayed fail code.

E - 1 (no sensor sensitivity)
E - 2 (sensor sensitivity too low)
E - 3 (sensor sensitivity too high)
E - 4 (calibration gas pressure adjustment failed)
E - 5 (unstable sensor sensitivity)

(1) E-1 (No Sensor Sensitivity)
This fail code is displayed if the sensor does not detect the calibration gas. The three most likely possible reasons for this are :

- Sensor sensitivity is unstable due to poor adjustment, or the sensor has reached the end of its service life.
  [Action] Try repeating the calibration. If " CAL FAIL " appears again, see Subsection 6.2.8 and take appropriate action.
- The calibration gas is not being sucked in from the probe AM FLOW " is displayed).
- The capillary is plugged and the calibration gas cannot flow out from the CAL PORT.

(2) E .2 (Sensor Sensitivity Too Low) or E - 3 (Sensor Sensitivity Too High)
This fail code is displayed if the sensor sensitivity is outside the calibration range.
[Action] Adjust the sensor sensitivity.
The tolerance range is 60 to 150% on the bar graph (the 150% end of this range is the lower sensitivity end). Sensitivity outside the tolerance range is indicated as follows:



Sensor sensitivity adjustment range

Use the HEATER variable resistor in the setup area to adjust sensor sensitivity. The HEATER variable resistor changes the voltage of the sensor heater. If the sensor sensitivity is too low, turn the knob clockwise. If the sensitivity is too high, turn the knob counterclockwise.

This adjustment cannot be completed simply by watching the sensitivity display while turning the knob. Repeatedly check the sensitivity by performing calibration after each adjustment (turn the knob about 30 to 90 degrees each time). Wait at least three minutes after each adjustment before performing the calibration so that the sensor temperature has time to stabilize. Repeat the adjustment and calibration procedure until the bar graph reaches 90, 100, or 110%.

3.2 Manual Calibration

Use the manual calibration method ff the instrument is not equipped with the auto calibration option.
Manual calibration is possible in both A-type and B-type measurement modes.
Note : An LS - 20B Leak Standard is required for manual calibration.

3.2.1 Setting the Switches

Manual calibration is done in manual calibration mode. Set the " CAL " switch in the setup area to the " MANUAL " position.

Also set the following three switches to match the type of gas, leak flow, and leak flow units of the LS - 20B to be used for calibration.

- Set the " GAS " switch to the position for the type of gas.
- Set the "UNIT" switches for the proper units.
- Set the "ALARM' switches to the leak flow value.

3.2.2 Operator Actions and Calibration Operation

Start the calibration procedure as follows:

(1) Insert the probe into the H-25C "CAL PORT" to apply an ON signal through the spring switch.

Note : When an S-probe is used, carry out this operation after removing the tube for introducing gas.

(2) After applying the ON signal, immediately pull the probe away from the "CAL PORT" and, with the instrument in search mode (probe switch not depressed), let the probe suck in clean air. The instrument will start its calibration operations after about seven seconds.

When it starts the calibration operation, the instrument will output a tone from the speaker. At this time, you must perform the following actions:

(3) With the probe switch not pressed, touch the probe tip to the LS - 20B PROBE port. Keep the probe touching until the reading on the display stabilizes.

(4) When the value stabilizes (wait at least ten seconds), press the probe switch once (for less than 0.5 sec.). The instrument will store the calibration data at that time.

(5) Immediately pull out the probe and allow it to suck in clean air.

After completing the calibration operation, the instrument will go into measurement mode. If you changed any switch settings, return them to their original condition.

3.2.3 What to Do If CAL FAIL Appears

If CAL FAIL appears during calibration, calibration is not performed. When the CAL FAIL indicator appears, one of the following three fail codes is displayed on the data display area while the instrument stabilizes.

E - 1 (no sensor sensitivity)
E - 2 (sensor sensitivity too low)
E - 3 (sensor sensitivity too high)

Refer to Subsection 3.1.3 for details of what to do when the fail code appears.

3.2.4 What to Do If the Alarm Code Appears

Unlike when the fail code is displayed, calibration is performed when the alarm code is displayed. When the data for calibration approaches the allowable limit, an error code (A-1 to A-3) is displayed for about four seconds before completing calibration.

The two alarm codes are as follows; take appropriate action depending on the alarm code displayed.

A - 1 (high background voltage)
A - 2 (short calibration gas suction flow rate)
A - 3 (short calibration gas suction flow rate)

Refer to Subsection 3.1.4 for details of what to do when the alarm code appears.

4. Measurement Operations

This chapter explains how the H-25C works, and how to detect leaks with it. Note that before doing any of the operations described here, you must first complete the operations described in Section 2 (switch setup, etc.) to prepare the H - 2 5C for use.

4.1 Choosing a Location for the H-25C, and Getting Ready to Start Measurement

4.1.1 Choosing a Location

The H-25C Halogen Leak Detector should be placed on a flat, horizontal surface such as a bench or table top when in use.

Since it is fairly heavy at about 10 kg (22 lb), the main unit will not easily slide off the table or bench even if you pull on the probe. However, consider that risk and make sure that you choose a stable surface on which to place it; a fall to the floor will probably cause the instrument to fail.

Keep in mind that instrument needs a location where the air is clean and pure, and a surface free of vibration. Facilitating leakage inspections varies depending on whether or not leakage inspection areas are clean; the service life of sensor and activated-charcoal filters also vary. for reference, examples of facilities that rid the atmosphere of unwanted gases where leakage inspections are made are given at the end of the manual (after chapter 6).

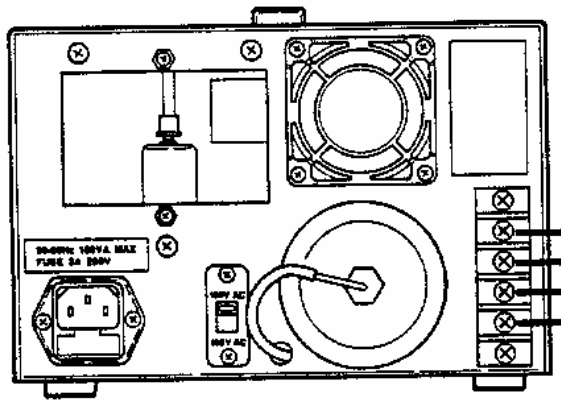
4.1.2 Getting Ready for Measurement

(1) Connecting the Power Cable
Supply the H-25C with AC power of 100 / 115 V or 120 / 240 V, as appropriate to its specifications and the supply voltage selector switch position.
Connect the plug on one end of the power cable to the power connector (socket) on the main unit, and then connect the other end to the AC line receptacle.
Use the supply voltage selector switch on the rear of the H-25C to select 100 and 115 V, 110 and 22OV, or 120 and 24O V.

CAUTION: Never connect power in the 200 V range to an H-25C with the 100/115 V specification, or to one whose supply voltage selector switch is in the 120 V position; the instrument will be damaged.

(2) Wiring the Analog Signal Output (if equipped with analog signal output function)
If you wish, you can order the H-25C with a function that outputs the measured value as a 0 to 1 V DC analog signal. If your instrument has this function, connect the wiring from the instrument to the recorder or other destination. (See Figure 4.1.)

Note that the output resistance is less than 1Ω. The 0.5 V level of the 0 to 1 V DC output signal corresponds to the alarm point setting value. This relationship always remains the same, and is unaffected by sensitivity changes in search mode, etc.



No analog output signal is output (that is, the output is 0 V) during warmup, calibration, or standby mode.
The alarm contact output changes state when the leakage flow goes above the alarm point, and then holds that state until the measurement decreases again to a value 20% below the alarm point.

0 to 1 V DC output signal

Alarm contact output

Figure 4.1 Analog Signal Output and Alarm Contact Output Terminal Wiring Connections

(3) Wiring the Alarm Contact Output Terminals (if equipped with contact output function)

(3) If you wish, you can order the H-25C with a function that outputs a contact signal when the measured value exceeds the alarm point. If your instrument has this function, connect the wiring from the instrument to signal destination. (See Figure 4.1.)

Note: See Subsection 2.2.4 regarding the state of the contacts when the alarm contact signal is output.

The maximum allowable voltage across the contacts is 220 V DC or 250 V AC. The maximum allowable current is 2 A. Note that if electrical noise is present at the connected load (or generated by the switching action), you should connect a noise killer, or surge suppression network, across the terminals, or take other appropriate countermeasures, since such noise may cause improper operation.

(4) Turn the Power Switch to the ON position to place the H-25C in operation. Insert the key provided into the keyhole in the power switch, and turn clockwise (to the right). Connect the probe before doing turning on power, if it is not already connected.

The H-25C will go into measurement mode after about 180 seconds of warm-up. During the warm-up time or immediately after transferred to the measurement mode, check the following.

- Make Sure that the Fan is Running
  The fan serves two purposes. One is to bring cooling air into the instrument. The other, if the instrument has the auto calibration option, is to maintain a consistent atmosphere inside the instrument. Thus it is vital that the fan be turning properly.

  Note: Calibration gas is normally flowing out not only from the ' CAL PORT " probe insertion opening, but also from the air intake hole (on the inside of the 'CAL PORT" section) as wen. In auto calibration the probe inserted in the " CAL PORT " takes in air from inside the instrument through this hole, together with the calibration gas. If the fan steps, calibration gas will accumulate in the air inside the instrument, and its effects will make accurate calibration impossible.

- Check the Cal Gas Secondary Pressure Displayed during Warm-up. (If auto calibration option is installed.)
  The calibration gas secondary pressure is normal if the indication is in the 100 to 200% range. Auto calibration can be performed if this indication is normal or, even if abnormal, is not less than 50% (although the " CAL FAIL " indicator will be flashing when in measurement mode). If it is below 50%, auto calibration is not possible.

- Is the "AIR FLOW" Indicator On ? (Check in measurement mode)

  The " AIR FLOW" indication tells you that the intake air flow is being reduced due to clogging of the probe air filter, or some other cause.

  Under normal conditions, the instrument will suck in a bout 4.5 ml/s of measurement gas from the probe. If the intake flow remains below about one quarter of this value for about 30 seconds, " AIR FLOW" will be displayed.

  If "AIR FLOW" is displayed, replace the probe filter. If the intake flow does not recover even though you have replaced the probe filter, then there is some other problem. (See Chapter 6.)

  Note that even if " AIR FLOW" is displayed, you may still be able to measure and calibrate normally in some cases. However, even in such cases we recommend that you take maintenance actions to restore intake flow to its proper value as soon as possible.

4.2 Measurement

4.2.1 Measurement Modes

The H-25C has two main measurement modes, A-type and B-type. Use the MODE switch to select the mode to be used (see Subsection 2.2.5).

A-type mode is used if there is very little unwanted gas in the surrounding atmosphere and its concentration is settled, while B-type mode is used if there is a relatively high proportion of unwanted gas in the atmosphere and its concentration fluctuates. Generally, use B-type for detecting leaks since there is usually unwanted gas in the atmosphere in the facility when measuring leaks.

B-type mode has two sub-modes: auto-zero mode and auto-zero hold mode. Auto-zero mode operates when the probe switch is off (not depressed). When the probe switch is on pressed), the instrument operates in auto-zero hold mode.

4.2.2 Searching for the Location of a Leak in B-type Mode

To find the location of a leak, use auto-zero mode (probe switch off). To identify the location, bring the probe tip to within 1 cm of the leak for several seconds. The intake flow of the probe is about 4.5 ml/s, with a response time of about one second.

CAUTION : Be very careful that no liquid is sucked into the probe, since this may damage the instrument.

In auto-zero mode, if the sensor output is greater than or equal to the alarm point set value, the speaker sounds an intermittent tone (frequency : 1000 Hz approx.), and the probe indicator lamp lights. The tone and the lamp are switched off when the value is 20% below the alarm point.

If the H-25C is equipped with an alarm contact output, then if the leak rate reaches the alarm point, a contact signal is output. This contact signal is also switched off when the value falls to 20% below the alarm point.
In auto-zero mode, the background potential is always updated (delay time: 5 to 10 seconds). Therefore, the indicated value brings back to 0% over several seconds even when a leak is detected. In this mode, the detection sensitivity cannot be increased such as in search mode in A-type mode.

Note : When the auto-zero function is in operation, the leak rate cannot be measured correctly. To measure the leak rate, perform the auto-zero operation in the gas concentration of normal atmosphere, and then hold the auto-zero value ('auto-zero hold mode").

4.2.3 Searching for the Location of a Leak in A-type Mode

To find the location of a leak, use search mode (probe switch off). The procedure for identifying the location of a leak is the same as in auto-zero mode in A-type mode.

CAUTION:
1. Be very careful that no liquid is sucked into the probe; failure of the instrument may result
2. If the sensitivity multiplier setting is too low, the instrument may not respond even if a leak is present. On the other hand, if it is set too high, the instrument may respond to the ambient gas level, making it difficult to identify the site of the leak.

Freon gas detection is performed by the following actions.

- In search mode, the 100% point on the bar graph indicator becomes the search mode alarm point.

Note : The search mode alarm point simply represents the value of the 100% point determined by the sensitivity ("GAIN" switch setting). The search mode alarm point does not initiate any action.

- Whenever the sensor output level is below the search trigger point (the 20% point on the bar graph), the " auto-zero " function acts to keep the indication at 0%.

  If the sensor output level is equal to or higher than the search trigger point, the auto-zero function action stops, and the value is displayed taking as the zero reference (0%) point the last auto-zero value measured before auto-zero action stopped. If a value equal to or higher than the search mode trigger is encountered continuously for 20 seconds or longer, the " calibration request " action will start (see Subsection 4.2.3).

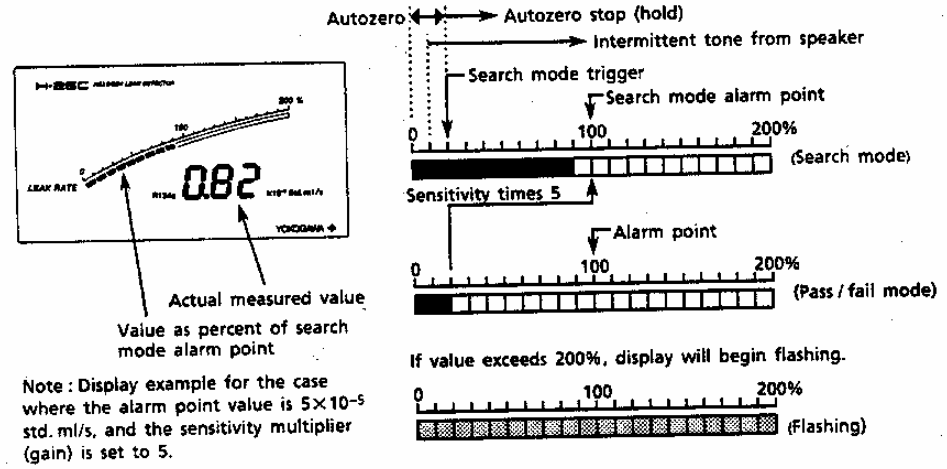


Figure 4.2 Display and Operation in Search Mode

- If the value is 10% or higher, the speaker sounds an continuous tone. The higher the value, the higher the tones (approx. 10 to 2000 Hz, hierarchically change). The probe indicator lamp lights with the tone change.

If you have difficulty in searching for a leak due to unwanted gas in the atmosphere I
Ambient gas levels high enough to exceed the search trigger level will not only interfere with the discovery of leaks, but will also result in annoying calibration requests. (A calibration request is generated whenever the search mode trigger level has been exceeded continuously for a 20-second period.)

Note : A calibration request is also generated when the time elapsed on the calibration request timer reaches the calibration request interval time setting.

If you have this problem, do one of the following:

- Pull the Nominal 0% Point Up to the Level that has exceeded the Search Trigger Point:
  Pressing the probe switch one time only for not more than 0.5 seconds will actuate the autozero function, and update the background potential. (Note that pressing it more than 0.5 seconds will provide pass/fail mode.)

  This method is effective for locating leaks when the background potential does not change.

- Lower the Sensitivity Multiplier:

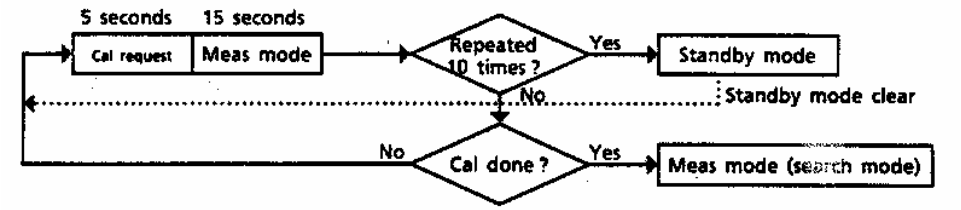
  If the sensitivity multiplier has been set to 10 or to 5, changing to a lower multiple (this will increase the search mode alarm point value) may have a favorable effect.

- Select B-type Mode for Detecting Leaks (see Subsection 4.2.3)

If the background potential is always varying, this is an effective aid to leak inspection.

[Auto-zero]
The sensor will output some voltage even for pure air. This is called the background voltage (or potential, or level). If freon and I or other gases are present in the ambient atmosphere, voltage components due to those gases will add to the background voltage.
The auto-zero function processes the sensor signal so as to make the background voltage serve, electrically, as the nominal zero point level. The auto-zero function operates when the sensor output in search mode is below the level equivalent to the search mode trigger point. This also means that any leak in the range where the auto-zero function operates will not be detected. Therefore, you must exercise care in the use of this feature if it is important to know for sure whether any leak is present.

["Calibration Request Operation] (functions in A-type mode)
A "calibration request" displays the flashing message "CAL", and outputs a speaker tone and flashes the probe indicator lamp in synchronism. After five seconds of this action, the instrument returns to measurement mode display for 15 seconds, but if you do not perform a calibration within that time, it will output the calibration request again. If this alternation between calibration request and measurement mode is repeated ten times, the instrument goes into a standby mode. (Chapter 3 shows the display in standby mode.) To cancel standby mode, press the probe switch once



"Calibration Request" Operation

4.2.4 Leak Rate Measurement in B -type Mode

To measure how much freon gas is leaking from a leak you have found, use auto-zero hold mode. The instrument goes into this mode when you hold the probe switch depressed.

To measure the leak rate, you basically just hold the probe tip near the site of the leak (within 1 to 5 mm). Note, however, that in practice some differences in technique may be required, depending on various conditions.

CAUTION : To measure the leak rate, perform the auto-zero operation in the atmospheric gas, then hold the auto-zero value.

When the sensor output is greater than or equal to the alarm point set value, the speaker sounds an intermittent tone (frequency: 1000 Hz approx.), and the probe indicator lamp lights. The tone and the lamp are switched off when the value is below the alarm point.

If the H-25C equipped with an alarm contact output, then if the leak rate reaches the alarm point, a contact signal is output. This contact signal is switched off when the value falls to 20% below the alarm point.

4.2.5 Leak Rate Measurement in A -type Mode

To measure how much freon gas is leaking from a leak you have found, use pass/fail mode. The instrument goes into this mode when you hold the probe switch depressed. The procedure for measuring the leak rate is the same as in B-type mode.

Operation in pass/fail mode is as follows:

- In pass/ fail mode, the 100% point on the bar graph display becomes the alarm point. The measured value in the display area is displayed with flashing. The alarm point is the value selected with the "ALARM" switches. Normally, you will set them to select the highest allowable value that will pass the leak inspection. You can change the alarm point setting value while the H-25C is operating. Changing the alarm point will cause the status of the "ALARM' switches to be displayed in the data display area for about three seconds after the change.

  Note : When changing the alarm point, keep in mind its interactions with the "GAIN" switch setting (Subsection 2.2.9).

- In pass/fail mode, the instrument holds the last auto-zero value. Therefore, once you have put the instrument in pass/ fail mode, any changes in the background potential will be treated as leak rate data.
  If the atmosphere does not stabilize thus making it difficult to measure the leak rate, try using B-type mode (see Subsection 4.2.4).

- If the leak rate is at or above the alarm point, the speaker will emit an intermittent tone (frequency: approx. 1000 Hz), and the indicator lamp on the probe will light. The tone and the lamp are switched off when the value falls below the alarm point. If the H-25C is equipped with an alarm contact output, then when the leak rate reaches the alarm point, a contact signal is output. This contact signal is switched off when the value is 20% below the alarm point.

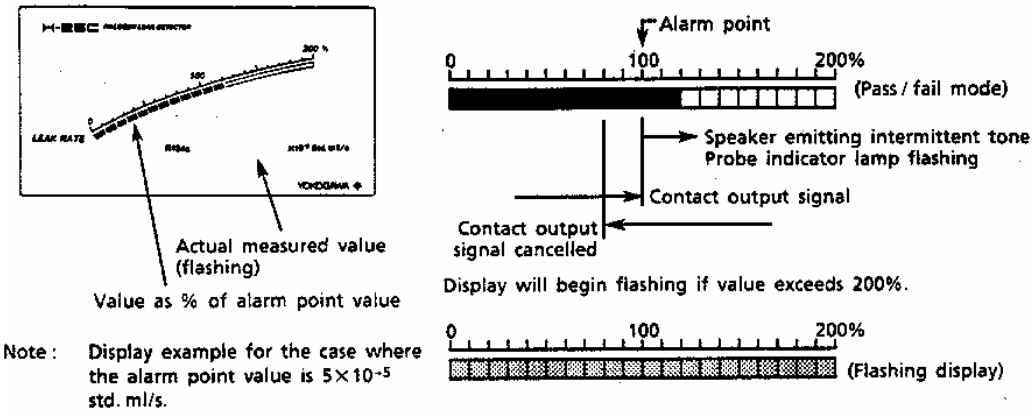


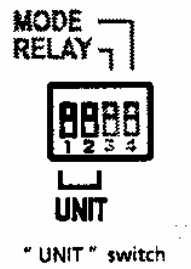
Figure 4.3 Display and Operation in Pass / Fail Mode

4.2.6 How to Check the Measured Value, and Possible Reasons for Abnormal Operation

[How to Check the Measured Value]

To check for error in the measured value, set a leak standard for a known constant leak rate, let the probe suck in the gas, and examine the indicated value. Use pass/fail mode during this measurement.

Note: If the instrument has the auto calibration option to display current calibration-gas flow rate in the data display section, set the ' UNIT " switch as shown in the figure below. Note that the displayed value is the result of computation based on the secondary pressure of the calibration gas. The displayed value may differ from actual value if dirt is attached in the capillary or the gas leaks from the gas bleed plug.



Setting of the UNIT Switch for Calibration Gas Flow Rate Display

Unit	Switch lever position	Display in the unit display area
×10⁻⁵ std. ml/s		×10⁻⁵ Std. ml/s

Note: ● Calibration gas flow rate appears in the data display area.
● After confirming the flow rate, be sure to the switch lever to the original position.

[Cause of Abnormal Symptoms]

If the instrument shows symptoms of abnormal operation during measurement or calibration, the most likely reasons are as follows:

- "AIR FLOW" indicator is *ON.*
  Probe filter is clogged. (See Section 5.1 for corrective action.)

- Leak rate displayed is too high.
  Activated charcoal filter performance is deteriorating. (See Section 5.2 for corrective action.)

- " Calibration requests " are being issued too frequently. Activated charcoal filter performance is deteriorating.

- " CAL FAIL " indicator is displayed (flashing).
  Calibration gas freon in the tank has been used up. (See Section 5.3 for corrective action.)

- Unable to calibrate ("CAL FAIL" displayed).
  Sensor performance has deteriorated. (See Section 5.4 for corrective action.)

4.2.7 Turning the Power Switch OFF

The usable life of the sensor and the activated charcoal filter are highly dependent on the time that power is ON (the time that gases to which the instrument is sensitive are being drawn in). We therefore recommend that you turn the instrument power switch OFF if you do not intend to make any measurements for a period of several hours.

Note that before turning the power switch OFF, you should always let the instrument draw in clean air for at least one minute.

4.3 R-12 Leak Detection

The leak detector sensor for measuring R-134a requires a much greater sensitivity than for measuring R-12. Since the H-25C has a very sensitive sensor, it generates a very large output for R-12. This causes any unwanted gas in the atmosphere to have large effects, resulting in disturbances, and this also affects the service life of the sensor. If the H-25C is used for detecting R-12 leaks then perform the following calibration procedures.

Note that the LS-20B Leak Standard is required for calibration.

4.3.1 Switch Setting

Perform calibration in manual calibration mode. Set the switches in the setup area as follows :

GAS switch: set to R134a
CAL switch: set to MANUAL
UNIT switches: set to ml/s
ALARM switches: set the leak rate set in the LS-20B

4.3.2 Calibration Procedures

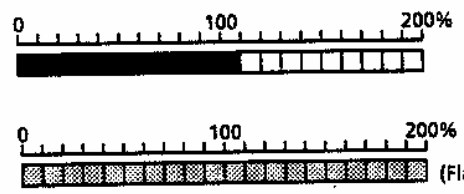
Perform calibration as follows :

(1) Insert the probe into the CAL PORT and provide ON signal for the spring switch. In case of the S-type probe, the tube for introducing gas must be removed to perform this operation.

(2) After providing ON signal, immediately remove the probe from the CAL PORT and suck in clean air without pressing any switch. The speaker sounds a tone about seven seconds later, then calibration starts.

(3) While in search mode, bring the probe tip near the LS-20B PROBE and keep it close until the value on the display stabilizes.

(4) When the display stabilizes (after about 1 0 seconds), press the probe switch once (for less than 0.5 sec.). Immediately pull out the probe from PROBE and suck in clean air. Use the reading at this time for the calibration data.



If the value is lower than 200%, the background voltage is normal.

If the value exceeds 200%, the background voltage is too high.

(5) Verify that the sensor sensitivity displayed on the bar graph area is between 60 and 100%. If it exceeds 100%, turn the HEATER variable resistor clockwise, and repeat the procedures from (1) until it lies within the range. If it does not reach 60% (Note), turn the HEATER variable resistor counterclockwise(generally, turn the knob three or four times more than the factory setting), and repeat the procedures from (1) until it lies within the range.

Note - CAL FAIL lamp lights when 50% or less

5. MAINTENANCE

Regular maintenance of your H-25C is required to maintain its performance. This chapter explains how to perform scheduled periodic replacements of consumable items and those parts that are known to deteriorate over time. For guidance on what to do in the unlikely event trouble occurs due to other causes, see Chapter 6.

Note that you should always turn the power switch OFF before starting any maintenance work.

5.1 Replacing the Probe Filter

Air (and measured gas) is drawn in through the probe at a rate of about 4.5 ml/s. Any dust drawn in by the air is removed by the probe filter. When the material removed begins to clog the filter sufficiently that a condition in which the flow drops to around 1/4 that rate continues longer than 30 seconds, " AIR FLOW " will appear on the display. (Note that " AIR FLOW " may also be displayed for other reasons.)

If "AIR FLOW" is displayed, first make a visual check of the probe filter. If it is dirty, replace it the filter has directivity. Attach it with its smooth surface on the side of the tube for introducing gas.

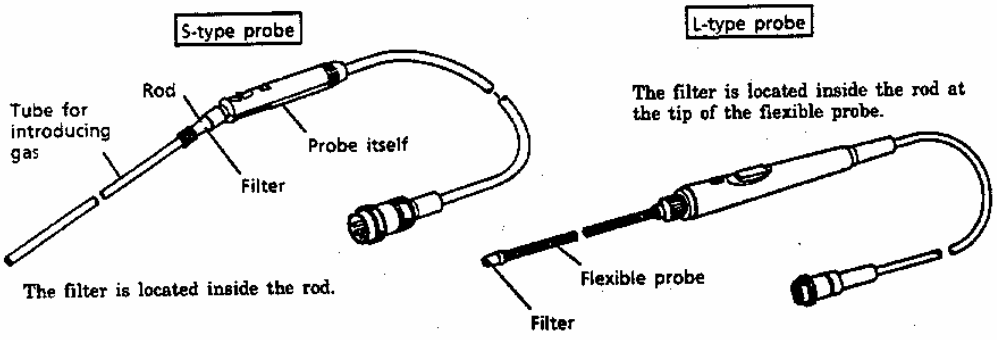


Figure 5.1 The Probe Filter

If "AIR FLOW" is still displayed even after you have replaced the filter, the cause may be one of the following.

- Suction pump malfunction
- Problem in the instrument internal tubing
- Flow sensor malfunction

See Chapter 6 for instructions on how to check for these problems, and what action to take.

5.2 Replacing the Activated Charcoal Filter

The measured gas going to the sensor is split into two a by a manifold, one stream being introduced with no treatment, the other being introduced after being passed through the activated charcoal filter to convert it to clean, pure air. If the activated charcoal filter is unable to purify the measured gas, the result will be the same as if extra untreated measured gas were flowing into the sensor, giving a too-high indication for the leak rate.

Since allowing extra untreated gas to flow into the sensor will shorten the sensor life, in addition to causing measurement errors, you must replace the activated charcoal filter before it loses its effectiveness at conversion. In general, if you are using the H-25C seven hours a day, an activated charcoal filter can be used for 30 to 60 days. We recommend that you schedule periodic replacements using these numbers as guidelines. If the measurement check described in Subsection 4.2.6 reveals error in the measurement, you should replace the filter promptly.

Note : The service life of the activated carbon filter may be greatly reduced if a large amount of freon gas is contained in the atmosphere.

The replacement procedure is as follows:

(1) Disconnect the tube from the tube joint attached to the activated-charcoal filter (case cap).

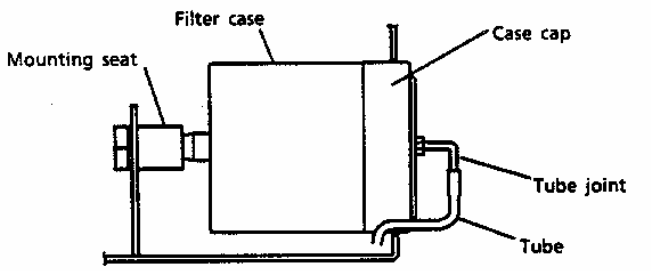


Figure 5.2 Activated-charcoal Filter (as mounted)

(2) Remove the activated-charcoal filter (filter case) from its mounting seat. (It is screwed into the seat, and must be turned counterclockwise to remove it.)

(3) Turn the case cover counterclockwise to remove the cover.

(4) Remove the used filter pack from the case.

(5) Take out a new filter pack from its bag.

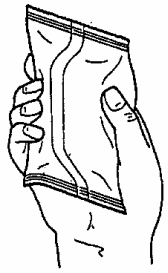


Figure 5.3

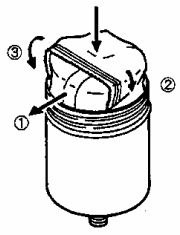


Figure 5.4

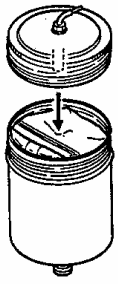


Figure 5.5

(6) Install the filter in the case as follows:

(a) First, squeeze the filter to fit it into the circular case. (see figure 5.3)
(b) Insert the filter into the case. Holding the seam 1) of the filter, fold both sides 2) and C3 into the case, then push them down into the case. (see figure 5.4)
(c) Push down the whole filter until it is lower than the top edge of the case.
(d) Replace the cover so the open end of the tube (beneath the cover) touches the center-portion, but must not touch seam or penetrate the filter bag. (see figure 5.5)
(e) Tighten the cover to complete the filter replacement.

(7) Screw the activated-charcoal filter (filter case) to its mounting seat.

(8) Insert the tube into the tube joint attached to the case cap.

5.3 Refilling the Tank With Freon

This maintenance operation is applicable only if the instrument has the auto calibration option. The R134a held in the tank for calibration use is consumed at a rate of 10 x 10-5 std. ml/s. When the calibration gas secondary pressure indication on the bar graph drops to the 1 00% point (98 kPa I 1.0 kgf/CM2 1), refill the tank with R - 134a by the following procedure. For filling, a dedicated liquid-freon-filling jig (part number : E708OFZ) is necessary.

Note: Part number : The item with part number E70BOFZ is an accessory attached to the LS - 20B leak standard, which contains auxiliaries other than the freon filling jig.

(1) Remove the instrument cover.

(2) Fully close the valve on the tank. Turn the handle on the tank top fully clockwise close.

(3) Close the regulator valve by pulling up on the knob and turning counterclockwise.

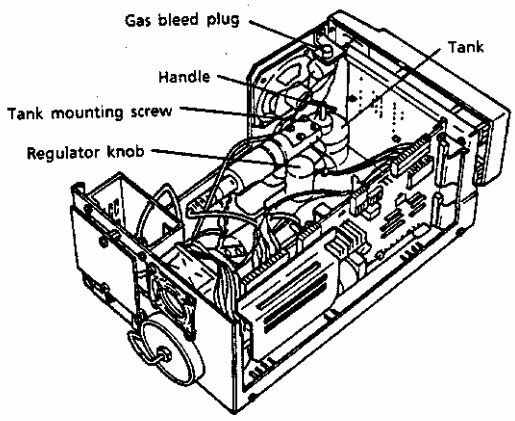


Figure 5.6 Tank and Regulator

(4) Loosen the two tank mounting screws, and remove the tank, being very careful not to lose the 0-ring at the tank's gas outlet port.

In the next step, you will begin the filling task. Since a large amount of freon gas will leak out during this process, you should do the work in a location well removed from the leak inspection area.

(5) Open the tank valve (turning the handle) to discharge the remaining R - 134a (gas).

(6) Weigh the tank before filling, so that you will be able to find out how much it has been filled.

(7) Mount the freon filler fitting on a service cylinder containing R - 134a. Before you do this, first make sure that the filler-fitting valve is closed. Then set the fitting on the cylinder and make sure that the three hooks on the clamp securely engage the cylinder top cover. Next, turn the valve body clockwise to pierce through into the cylinder.

(8) Connect the service cylinder and tank using the coupler on the filler fitting. To do this, first remove the plug from the tank, and attach the coupler in its place. Screw the coupler on and tighten lightly with a wrench. Next, Connect the valve that you mounted on the service cylinder to the coupler. Screw them together by hand.

(9) Turn the service cylinder upside down, and allow the tank to fill with liquid R - 134a. First, fully open the valve attached to the service cylinder. Next, very slightly open the valve on the tank (turning the

handle), allowing the air to be expelled as the liquid R - 134a enters. After a short while some misty liquid R 134a will begin to spray out in a mist.

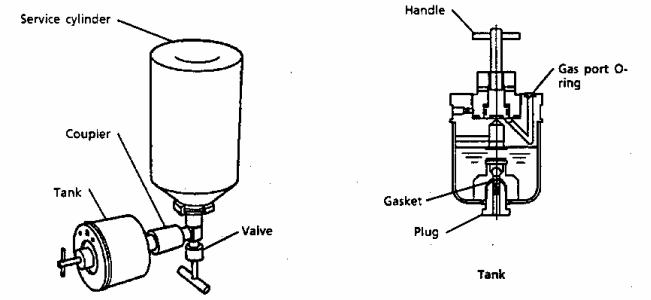


Figure 5.7 Condition of Cylinder and Tank During Filling Operation

Wait about 10 seconds after the mist begins spraying out, and then close the tank valve. Also be sure to close the service cylinder valve. Then, waiting about one minute between repetitions, very slightly open the tank valve again for about 5.seconds, and repeat this action two or three times.

(10) Remove the coupler from the tank, and remount the plug as it was originally. As soon as the coupler is removed, R - 134a gas in the tank blows off. Quickly perform the work. Tighten the plug to a torque of about 3 N-m f 30 kgf-cm 1.

(11) Verify that enough R - 134a liquid (25 to 30 g) went into the tank. Weigh the tank, and compare the new weight to the weight measured in " (6) ". Also examine the tank to make sure that there is no leak from the plug area.

(12) Remount the tank in the instrument main unit. Check to make sure that the gas outlet port 0-ring is in place, and firmly tighten two mounting screws.

(13) Adjust the calibration gas secondary pressure following the procedure given in Section 2.6.

Note that proper calibration will be impossible if any air is left in the tubing. After adjustment, loosen the gas bleed plug for about three seconds; repeat @s action two or three time.

5.4 Replacing the Sensor

Since the sensor sensitivity will gradually deteriorate over time, you will need to adjust the " HEATER " variable resistor whenever the sensor sensitivity displayed during calibration goes outside the permissible range (60 to 150% on the bar graph). When the " HEATER " variable resistor shaft will not rotate any farther in the clockwise direction, the sensor has reached the end of its useful life.

Note: Our guideline for sensor life is 900 to 1000 hours of operation. However, the life is sometimes shorter, depending on the concentration of the reacting gases (freon, etc.) and how long they are drawn in.

When the sensor reaches the end of its life, you must replace it with a new sensor. The replacement procedure is as follows:

(1) Turn the power switch OFF, and wait until the sensor has cooled down (about ten minutes).

(2) Remove the instrument main unit cover and the sensor chamber cover. Then remove the sensor, by first disconnecting the tubing connector on its top and then unplugging it from its socket.

(3) Plug the new sensor into the socket. Then reconnect the tubing connector to the sensor. After thus installing the sensor, replace the main unit cover and the sensor chamber cover.

(4) Return the " HEATER " variable resistor adjustment shaft to its starting position. First, turn it counterclockwise until you reach the limit of rotation, then turn it back clockwise 12 full turns.

(5) Adjust the sensor sensitivity so that the bar graph indicates a value between 80 and 110% (see Subsection 3.1.3).

5.5 Replacing the Disc Filter

If liquid is sucked in by mistake or the gas suction too weak even after replacing the probe filter, check the disc filter in the instrument (see page 6 - 2 , tiger 6.1 any liquid or contamination, replace the disc filter.

Note: If any liquid is sucked in, dry the inner tube before replacing the filter.

Note the following when replacing the filter:

- Turn the power switch off.
- Since the disc filter distinguishes the inflow direction from the outflow direction, mount it correctly. The shape of the filter case on the gas-inflow side is simpler than on the gas-outflow side.

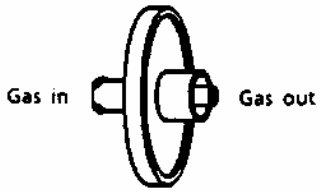


Figure 5.8 Disc Filter

5.6 Replacing the Fuse

If the instrument will not operate at all when you apply power, check the fuse. The fuse is mounted inside the power cable connector on the main unit rear. You will also find a spare fuse stored in the connector.

These fuses are attached to a cover, which also serves as the fuse holder; use a flat-blade screwdriver to open this cover.

If the fuse connected in the circuit is open, replace it with the spare fuse.

[Fuse Ratings] - 3.15A, 250V, fast-blow, miniature type (Bacharach part number: K9346JD)

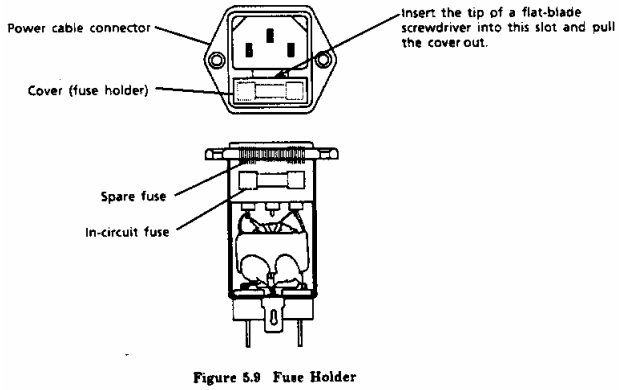

Power cable connector
Insert the tip of a flat-blade screwdriver into this slot and pull the cover out.
Cover (fuse holder)
Spare fuse
In-circuit fuse

Figure 5.9 Fuse Holder

6. TROUBLESHOOTING

This chapter explains how to identify and take corrective action for certain types of malfunctions.

If you find that the malfunction is due to actual failure of the instrument hardware, contact your Bacharach representative for service. Such repairs can be made only by an authorized Bacharach service center.

6.1 Improper Use Leading to Hardware Failure

Improper use that can cause hardware failures must be absolutely avoided. Subsections 6.1.1 and 6.1.2 describe two types of improper use against which you must take particular care.

6.1.1 Never connect 240 V power when the supply voltage selector switch is set to a 100 V range

Note: The H-25C is offered in three versions : 100 / 115 V, 110 / 220 V, 120 / 240 V power.

Connecting 240 V power to an H-25C set up for a voltage in the 100 V range will burn out the transformer. (In some cases, only a blown fuse may result.)

If you accidentally make this mistake, check the fuse first. If the instrument does not operate after you replace the fuse, repair will be required.

6.1.2 Never allow liquid to be sucked in

The tubing system inside the instrument includes a manifold designed to precisely divide the measured gas flow. If you allow liquid to be sucked into the instrument, contaminants will be deposited on the manifold surfaces, changing the division ratio so that accurate measurement will become impossible.

If there are any liquids in use in the area where the instrument is placed, or it is possible that there may be condensation on the equipment being inspected, you must take great care in the handling of the probe.

If any liquid is accidentally sucked in, turn the power switch OFF immediately. Then do the following:

- If liquid did not get into the instrument's internal tubing. If the amount drawn in was small, and you noticed it immediately, then the liquid may not have gone past the probe filter. Check the probe filter. If the gas outlet side of the probe is somewhat wet, replace the filter after drying the tip of the probe (the tube for introducing gas for the S-type probe and the flexible probe for the L-type probe). If the liquid penetrated to the cable section, remove the filter and flow air through from the connector end to dry the inside of the tubing.

- If liquid did get into the instrument's internal tubing In most cases where liquid has been continuously drawn in for some time, the liquid will have entered the instrument's internal tubing system. Inspect the disc filter in the instrument, and if there is any leakage, the instrument must be repaired by Bacharach.

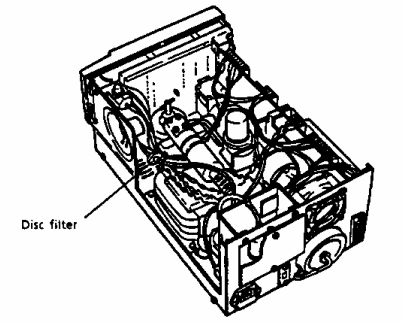


Figure 6.1 Disc Filter Mounting Position

6.2 Possible Causes of Malfunctions, and What to Do If They Occur

Table 6.1 lists the most common malfunctions (symptoms). Subsections 6.2.1 through 6.2.10 show what can cause these symptoms, and what to do if they occur.

When it Happened	Symptom	What to Read
When power applied	Doesn't operate at all	See Subsection 6.2.1
	"CAL FAIL" on steady during countdown	See Subsection 6.2.8
During measurement	Does not detect leaks	See Subsection 6.2.2
	Measured value is too low	See Subsection 6.2.3
	Measured value is too high	See Subsection 6.2.4
	"AIR FLOW' on steady	See Subsection 6.2.5
	Frequent calibration requests	See Subsection 6.2.6
	Very short sensor life	See Subsection 6.2.7
During calibration	"CAL FAIL" on steady	See Subsection 6.2.8
	Cal gas in tank used up to quickly	See Subsection 6.2.9
	Won't calibrate to proper value	See Subsection 6.2.10

6.2.1 Does Not Operate at All

The three most likely causes are

(1) Blown Fuse - After making sure that power is actually being supplied, check the fuse. (See Section 5.6)
Note: If fuses are blowing frequently, have the instrument inspected by Bacharach.

(2) Broken Wire in Power Cable Replace with good cable.

(3) Transformer Burnt Out Return to Bacharach for repair (component replacement).

6.2.2 Does Not Detect Leaks

The four most likely causes are:

(1) Search mode trigger point value is too high. Increase the search mode sensitivity multiplier. (See Subsection 2.2.9)

(2) Air is leaking into the probe through the probe seal (O-ring or gasket) Check whether or not the nut (rod) is loose. For the L-type probe, check whether or not the 0 - ring is in place.

(3) Tubing not connected to sensor.

(2) Sensor failure. Replace with good sensor.

Note: If the sensor is not heating up, return the instrument to Bacharach for repair.

6.2.3 Measured Value is Too Low

The three most likely causes are:

(1) Not properly calibrated. Re-calibrate.

(2) Air is leaking into the probe through the probe seal (0 -ring or gasket Check whether or not the nut (rod) is loose. For the L-type probe, check whether or not the 0 -ring is in place.
(3) Contamination deposited on manifold internal flow path surfaces. Return to Bacharach for repair (component replacement).

6.2.4 Measured Value is Too High

The three most likely causes are:

(1) Not properly calibrated. Re-calibrate.

(2) Activated charcoal filter has reached end of life. Replace with new activated charcoal filter.

(3) Tubing not connected to activated charcoal filter.

6.2.5 “AIR FLOW" on Steady

The most likely five causes are

(1) Probe filter clogged. Replace with new filter.

(2) Clogged disk filter. Replace with new filter.

(3) Pump not working, or performing poorly. Replace with good pump.

Note - No adjustment required after replacement.

(4) Manifold internal flow path clogged. Return to Bacharach for repair (component replacement).

(5) Flow sensor failure Return to Bacharach for repair (component replacement).

6.2.6 Frequent Calibration Requests

The most likely two causes are:

(1) Instrument is reacting to some gas in the surrounding air. Improve the operating environment. Decrease the search mode sensitivity (sensitivity multiplier). (See Subsection 2.2.9)

(2) Calibration request interval time setting is too short. Set longer interval. (See Subsection 2.2.8)

6.2.7 Very Short Sensor Life

The most likely three causes are:

(1) Sensor sensitivity set too high. Lower sensor sensitivity. (See Subsection 3.1.3)

(2) Activated charcoal filter not drawing in gas. Replace with new activated charcoal filter. (activated-charcoal pack)

(3) Liquid has been sucked into the instrument.

6.2.8 "CAL FAIL" on Steady

The most likely five causes are:

[If occurring during countdown at power-on:]
Note: Verify that the steady-on or flashing condition recurs.

(1) EEPROM failure. Return to Bacharach for repair (component replacement, adjustment).

[If occurring during calibration]

(2) Sensor sensitivity outside of permissible range. Adjust sensor sensitivity (See Subsection 3.1.3)

(3) Sensor has reached end of life. Replace with new sensor. (See Section 5-4)

(4) Calibration gas (liquid) in tank completely used up. Refill tank with liquid R - 134a. (See Section 5.3)

(5) Capillary clogged. Return to Bacharach for repair (component replacement, adjustment).

6.2.9 Liquid R134a in Tank Used Up Too Quickly

The most likely two causes are:

(1) Leakage from gas bleed plug (at capillary receiver section). Check first whether plug is loose. If not, replace 0-ring.

(2) Leakage from tank seal (gas outlet port 0-ring, or plug area). Replace bad component. (Replace according to procedures in Section 5.3).

6.2.10 Won't Calibrate to Proper Value

The most likely four causes are: [If during auto calibration]

(1) Fan not working. Replace fan.

(2) Contamination deposited inside capillary, preventing calibration gas from flowing at specified rate. Return to Bacharach for repair (component replacement, adjustment).

(3) Air left inside tubing (immediately after refilling tank with R - 134a). Loosen gas bleed plug and let air escape.

[If during manual calibration]

(4) Value entered in calibration differed from leak standard leak rate. Repeat calibration, entering the correct value.

[Reference] Facilities for Ridding the Atmosphere of Unwanted Gases Where Leakage Inspections Are Made

Sensors in the H-25C Halogen Leak Detector sense exhaust gases from automobiles and volatilized gases from organic solvents, floor cleaning agents, and -paint as well as halogen gases including freon. Thus, if any of these gases are in the surrounding atmosphere of locations when inspections for leakage are made, the following two problems may occur.

1. The service life of sensors and activated charcoal filters is shortened.

2. It becomes difficult to find and measure slight leaks.
   If these problems are anticipated, it is recommended that the facilities described below be provided.

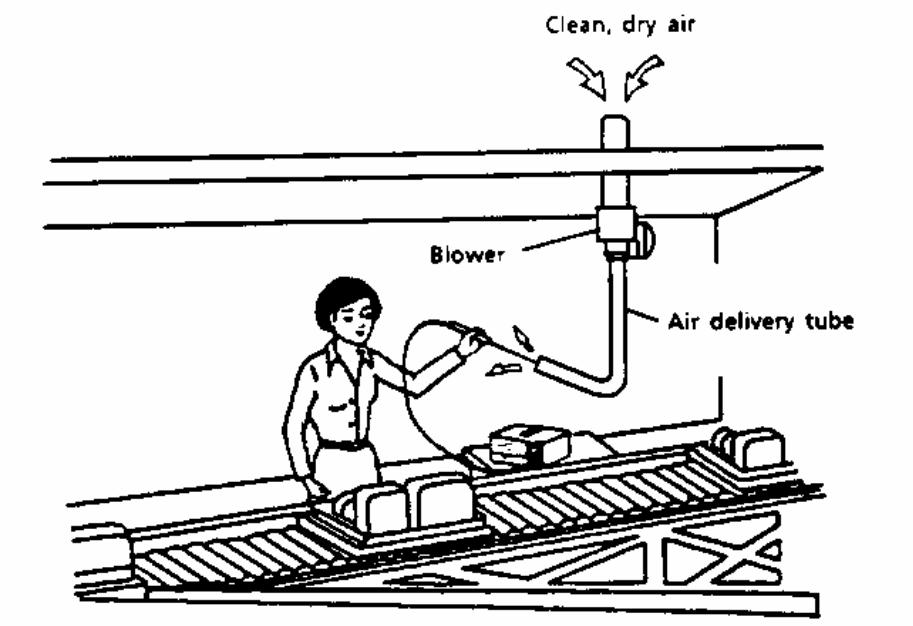
   [Example 1 of Proper Facility]

   Reference Figure 1 shows an example of a facility that helps extend the service life of sensors and activated charcoal filters. As shown in the figure, providing a facility with clean air that can be auctioned through the sensor probe when preparing for measurement greatly reduces the time needed to suction the unwanted gases. This not only prolongs the service life of sensors and activated-charcoal filters, but also makes accurate calibration (based on clean air as the background) possible in locations where inspections for leakage are made.

   In addition, provide such a facility by taking into account the following requirements:

   (1) Do not allow moisture to collect on the inside of the delivery tube as droplets.

   (2) Make sure the e is securely fastened (cannot drop).

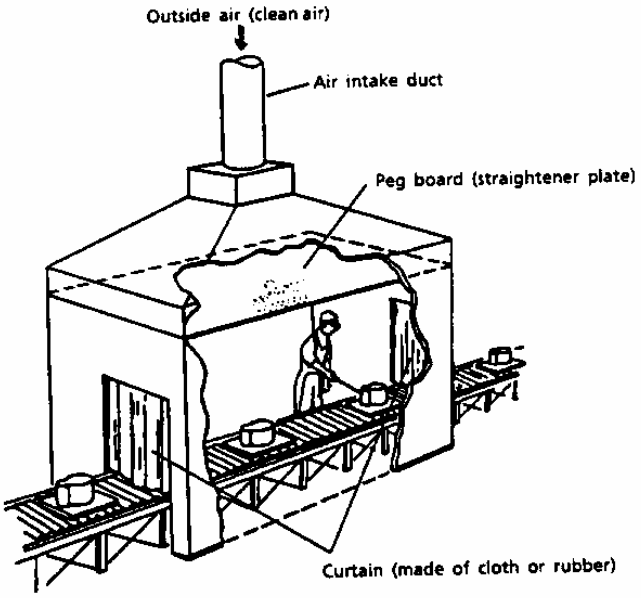


Have clean air suctioned through the probe when preparing for measurement.

[Example of Facility 2]

Reference Figure 2 shows an example of facility for efficiently implementing leakage inspection.

This facility is also provided with countermeasures to prolong the service life of sensors and activated charcoal filters.



Reference Figure 2. Example of Facility that Rids Atmosphere of Unwanted Gases Where Leakage Inspections Are Made

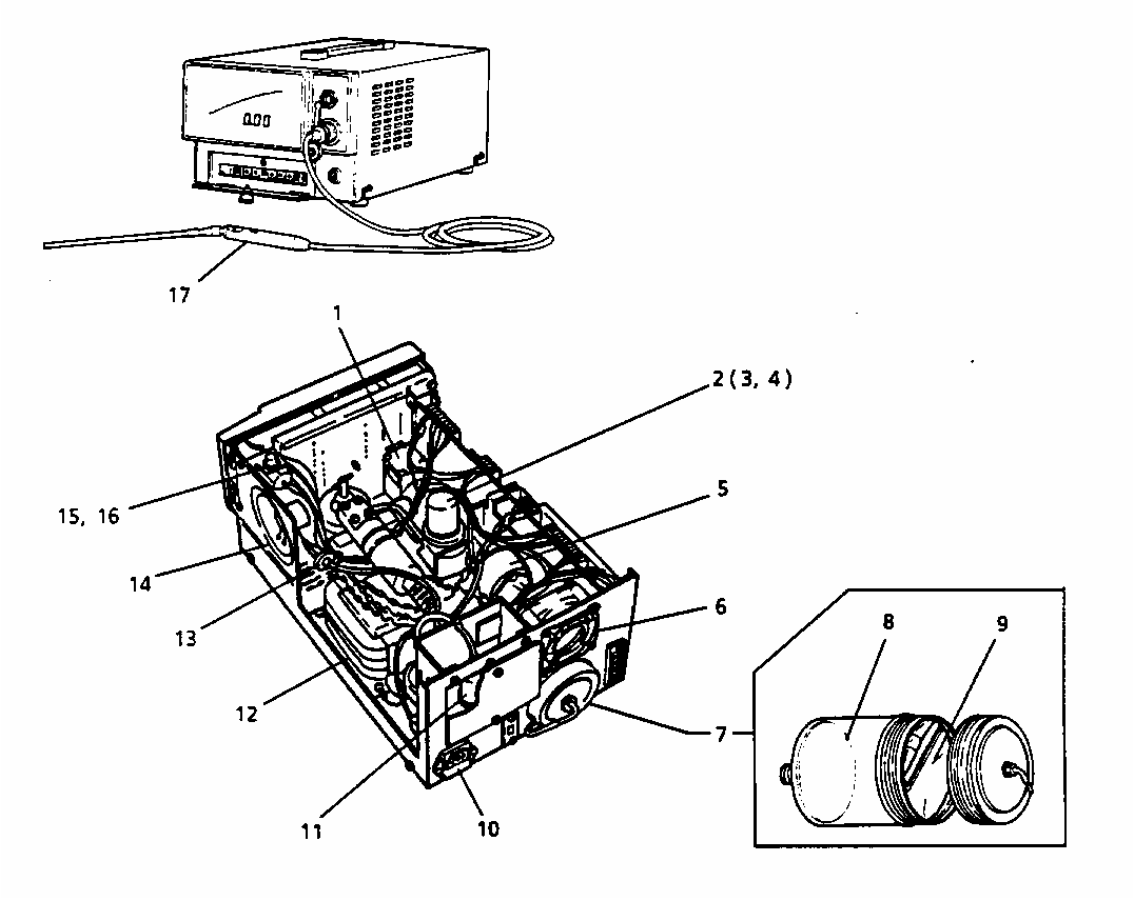
If the facility to be provided is similar to that shown in Reference Figure 2, take the following requirements into consideration.

(1) The air flow inside the facility cannot cause negative pressure.

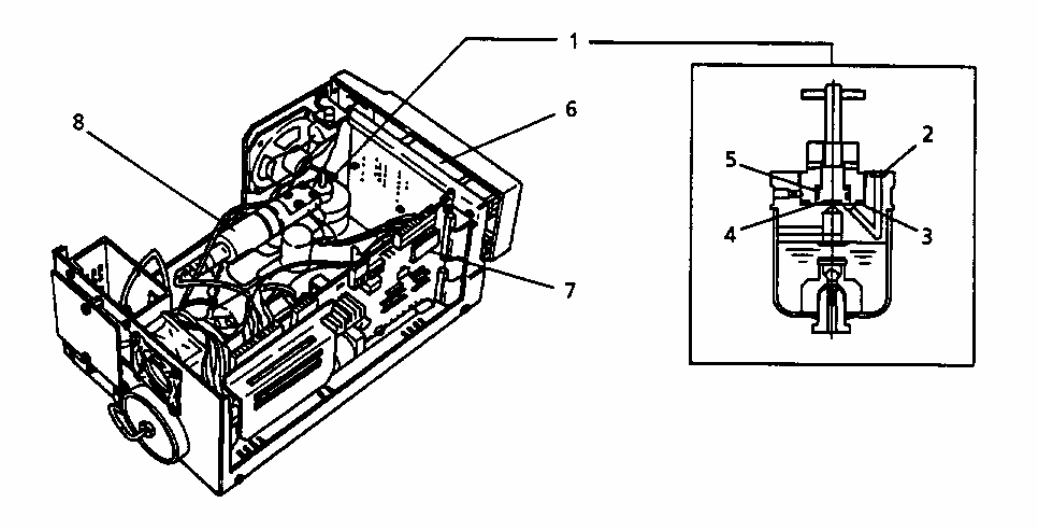
(2) Air is fed to the inspection area in an evened-out flow.

(3) The inspection area cannot be so seriously affected by the temperature and humidity of the outside air.

Customer Maintenance Parts List



Item	Part No.	Qty.	Description	Item	Part No.	Qty.	Description
1	3015-1113	1	Pump Assembly	13	3015-2476	1	Filter
2	3015-4181	1	Regulator Assembly	14	3015-1092	1	Speaker
3	3015-1134	1	Regulator	15	3015-1182	1	Screw
4	3015-2753	2	O-Ring	16	3015-2757	1	O-Ring
5	3015-1209	1	Flow Sensor Assembly	17	-		Probe
6	3015-1310	1	Fun Assembly		3015-1855		S-type, 1.8 m
7	3015-2363	1	Activated-charcoal Filter		3015-1860		S-type, 4.5 m
8	3015-2398	1	Sheet (filter)		3015-2213		L-type, 1.8 m
9	3015-2418	1	Activated-charcoal Pack (5 pcs)		3015-2150		L-type, 4.5 m
10	3015-1630	1	Fuse (3.15 A 250V)		3015-2218		L-type, 7.5 m
11	3015-0807	1	Sensor				
12	-	1	Transformer Assembly				
	3015-2552		(for 100/115 V power)				
	3015-2556		(for 120/240V power)				
	3015-2560		(for 110/220V power)				



Item	Part No.	Qty.	Description
1	3015-1200	1	Tank Assembly w/freon
2	3015-2668	1	O-Ring
3	3015-2672	1	O-Ring
4	3015-2676	1	O-Ring
5	3015-0947	1	O-Ring
6	3015-1545	1	Printed-circuit Assembly
7	-	1	Printed-circuit Assembly
	3015-2096		(For 100/115V power)
	3015-2102		(For 100/115V power. With output signal)
	3015-2108		(For 120/240V or 110/220 V power)
	3015-2114		(For 120/240V or 110/220V power. With output signal)
8	3015-1194	1	Pressure Sensor

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